SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1884.—Vol. XLI. LONDON, SATURDAY, SEPTEMBER 30, 1871. PRICE ..... FIVEPENCE PER ANNUM, BY POST, £1 4s.

Original Correspondence.

THE IRON TRADE OF NORTHAMPTONSHIRE.

The development of the extensive and valuable beds of ironstone found throughout the greater part of Northamptonshire is now being rapidly pushed forward, and the demand for the iron made from the ore is such that new furnaces are about to be put up in different localities. Large, however, as is the output of stone and iron at the present time, yet the trade is only now in its infancy, as there are as yet vast districts where the minerals are undisturbed, such as Cold Ashby, Yardley Hastings, Wootton, Great Addington, Houghton, Ecton, &c., and on the other side of Northampton there is very little doubt but what valuable deposits will be found between Daventry and Rugby; and, as the county is 60 miles in length, with 630,358 statute acres, it is not easy to determine the actual extent of the ironstone measures, which vary very much in thickness, in some places being 5 or 6 ft., and in others from 16 to 20 ft. At Addington, Towcester, and on Lord Overstone's estate, so little was the stone thought of up to a comparatively recent date that the walls were built of it. Now, however, it is very differently appreciated, the demand being such that all that is raised, after supplying the local furnaces, finds ready markets in South Wales, Staffordshire, Derbyshire, Yorkshire, &c.

The great centre of the trade is now Wellingborough, where the ore was first converted into iron by Mr. W. Butlin, and whose success has led so far to the present development of the mineral wealth of the county. That the town named has been greatly benefited by the introduction of a new and important industry is evident from the fact that the population during the past ten years has increased no less than 35 per cent., whilst Market Harborough and Thrapstone have decreased. The next ten years, however, will show a different state of things, as long before then both places will become important mining districts. The Messrs. Butlin are now raising a very large tonnage of ironstone, having every facility for sending any quantity away, either by the Midland or London and North-Western Railway, having sidings on to both from the works. They have some hundreds of wagons engaged in the trade, and are sending away weekly nearly 3000 tons, besides what is consumed by themselves. Some of the stone raised by the firm named is amongst the richest yet found in the county, containing from 40 to 46 per cent. of iron, the ore being free from sulphur, highly silicious, and in several districts is highly valued for mixing with other ores of a different character. At the works there is an extensive laboratory, where different ores are chemically tested, with a view to the apportioning of the fuel and flux to produce the best possible quality of iron. There are four furnaces at Wellingborough belonging to the Messrs. Butlin, two of them being near to the Midland station, and the other two close to the town. At the present time there are three in blast. Of the iron made we were informed that it had been recently put through the most severe tests at the well-known works of Messrs. Hipkins and Co., of West Bromwich, and passed through them in a highly satisfactory manner. It was found to be well adapted, amongst other things, for the making of armour-plates, and one well-known firm have offered to take 100 tons a week for that purpose.

The Wellingborough Bar Iron Company, who commenced erecting works and laying down a plant some time since, have of late made considerable progress towards completing them, and they are expected to be in full operation in the early part of next year. They are situate a short distance from the furnaces of the Messrs. Butlin, near to the Midland Railway, and on to which a branch is nearly finished. The stack has been completed, and is 95 feet high, and 10 feet 6 inches in diameter at the top. Some of the machinery has been laid down, and the remainder is ready. It is proposed to roll principally merchant and guide iron. The company have also taken an extensive field of ironstone adjoining the works, so that business will be commenced under favourable auspices.

The Messrs. Williamson and Co., one of the oldest firms connected with the iron trade in the county, and large consumers of Northamptonshire "pig," having works close to the Midland station at Wellingborough, are busily engaged in railway chairs, ornamental pillars, and London and Leamington kitchen ranges, and similar castings. All the productions are made of Northamptonshire pig-iron, the firm having used during the last six years upwards of 20,000 tons of it.

We may say that the facilities afforded by the Midland Railway Company have done much in developing the minerals in the district named, and Wellingborough has become an important place on the line, having large engine-sheds, warehouses for corn, &c., and has also been made a large depôt for locomotive coal. That the facilities thus afforded on the line between Market Harborough and Wellingborough will be of the greatest benefit to the Midland is plain, seeing that nearly two-thirds of the iron ore raised in Northamptonshire goes over that railway, the quantity passing over it in 1870 being 319,696 tons, whilst during the past year it must have considerably exceeded 400,000 tons. We may also fairly conclude that the production at the close of the present year throughout the county will be fully 700,000 tons, and of which the greatest share will go to the Midland. We may also say, with the new works contemplated at Market Harborough and other places, and the disposition shown by capitalists to embark in the iron trade, but a few years will elapse before the production of stone in Northamptonshire will be put down at 1,000,000 tons a year.

The Glendon Iron Company have their extensive works about 200 yards from the Finedon Station of the Midland Railway, by the side of the line, and scarcely two miles from the furnaces at Wellingborough. There are in blast three large iron-cased furnaces, connected together by a platform, and the usual machinery. The gases are utilised, being taken from the top in the usual manner, for heating the boilers and stoves. The furnaces are about 45 ft. high, 15 ft. in the bosh, two being worked with five tuyeres and the other with six tuyeres. There is a large condensing-engine, of 60-horse power, with 38-in. cylinder and 7-ft. stroke. The blowing-cylinder is about 7 ft. 6 in. in diameter. The second blowing-engine is a high-pressure one, by Mr. W. Butlin, and is of 50-horse power, with 6-foot stroke. There is a perpendicular lift for taking the material to the furnaces, one empty wagon descending whilst a full one is ascending, and is worked by a horizontal engine of about 25-horse power. A double-action pump-lift takes the water to the tank at the top, and is worked by the blast-engine, which is by Mr. Davis, of Tipton. There are seven boilers, three of them double-flued, and the others of the ordinary oblong type. One of them is about 60 ft. long, two 50 ft., and the remainder about 30 ft. in length. The ironstone is raised in two directions, the nearest being that on the estate of Mr. Mackworth Dolbin, of Finedon Hall, there being a line from where it is obtained direct to the furnaces, the distance being about a mile. The best stone, however, it appears comes from the Glendon Hills, by rail, about six miles from the works, a train-load of from 25 to 30 wagons being brought down daily. The limestone required for smelting is got in close proximity to the works, an advantage not always obtained on the same estate as the ironstone. The necessary coal comes from the pits in the neighbourhood of Nottingham and from Derbyshire, but the company (Messrs. Fisher and Checklands) have sunk in the Alfreton district, no great distance from Chesterfield, where the coal is well adapted for smelting purposes. The coke required also comes from Derbyshire, a good deal from the ovens of Mr. Rangeley, of Unstone, the company sending a fair tonnage of ore into that locality.

In the Thrapstone district a large quantity of ore has been raised at Woodford, on the estate of the late General Arbuthnot. The Islip Company, with which Mr. Plevins is intimately connected, are about to erect two blast-furnaces, and it is said will lay the ground out for four, so that another iron-making district will have to be added to those already existing, and so adding to the production of the raw iron as well as to the importance of the county of Northampton. The Stanton Iron Company, who have five blast-furnaces near Stanton-gate, in Nottinghamshire, have commenced working the Northampton ore, and have put a tramway down from the place where it is being raised to the Midland, at Wellingborough. At Market Harborough, also, operations on an extensive scale, it is understood, will shortly be commenced for raising ore, and it is more than probable that blast-furnaces will be erected, the site for four having been marked out some considerable time since. Valuable deposits of stone have been found in the neighbourhood of Peterborough, as well as in other localities, that no doubt in time will be developed, seeing that the increasing demand for iron is such as must lead to the necessity of furnaces being erected in districts where large quantities of ironstone are found, even if the coal is at some distance; and there can be no doubt but prices will continue to be such as to prove remunerative, not only to the landowners, but to capitalists who may engage in the production of pig or the manufactured material.

Having noticed, so far, the works on the Midland side of the town of Northampton, a brief notice of those near to it and on the London and North-Western may be given. Mr. G. Pell has been working extensive fields of ore at Gayton, which is close to Blisworth station, and also at Duston, a hamlet adjoining Northampton. G. H. Bevan and Co. are also raising stone at Blisworth, a good deal of which is sent to South Wales and Staffordshire, and also to some of the local works. At Lower Heyford, near Weedon, the three furnaces have been kept well going. The gentleman who now has the works in hand, Mr. Plevin, is connected with the coal trade in Derbyshire, and we believe is about commencing iron-making in another part of the county. There are some other places where ore is raised, such as Cogenhoe, Stowe, &c., but they do not require any special mention.

In conclusion, we can say that so far as the iron trade throughout Northamptonshire is concerned the prospects are as cheering as they well can be. Free from disputes, there must be a more rapid development of the minerals even than there is at present, with a large increase of population, tending to the benefit of all classes.

THE IRON AND STEEL INSTITUTE—THE EXCURSIONS.

At the conclusion of the breakfast given at the Dudley Arms Hotel by the Earl of Dudley, the members of the Dudley Mining Institute and their visitors started in several brakes to view various places of interest. Mr. Johnson conducted the party, and admirably was everything carried out. The first halt was made at the Grace Mary Colliery, the property of Mr. Samuel Minton, which is situated at nearly the summit of the Rowley Hills. These hills are composed of igneous rock or basalt, and the same formation, which must have poured out immediately after the coal measures were deposited, shows itself at Barrow Hill, near Dudley, Powk Hill, Walsall, and other places, but to a less extent. The party did not descend the pits, but we have lately done so, and can, therefore, speak with greater confidence as to the state in which the coal and ironstone have been found. The whole space underlying this basaltic range, and, in fact, to the distance of a mile from its outer edge, has till late years always been considered an igneous waste, and men well versed in mining matters said there would be no coal found there. This idea has been entirely exploded, as some of the best collieries in the Black Country have been on the surrounding edge of these hills. This rock and the beds of marl, which are neither more or less than decomposed trap, accompanying it, belong to the latter part of the carboniferous age, and were ejected in the state of molten lava; whether subaqueous or subaerial can only be conjectured. It is, however, certain that they form only a thin capping overlying the coal measures, which lie in their regular order beneath. It is also a very curious fact that in the two sinkings made from the summits of the hills the igneous matter is only found at the surface, and not again until the Thick coal is reached, where, in each instance, it is injected in thin streaks, resembling in shape forked lightning. Mr. Minton's pits are sunk from almost the highest peak of the hills, and after the 6 ft. of basalt was gone through no more was met with till reaching the Thick coal, although within a stone's throw of the shafts there is an open quarry, showing columnar basalt nearly 100 ft. thick. The Thick coal has been reached at a depth of 275 yards, and is found to be of the extraordinary thickness of over 11 yards, and of a fair average quality, excepting where it comes in contact with the intrusive rock, where it is very much blacked. No basalt is found below the Thick coal, and the Gubbin Stone and Heathen coal are of exceedingly good quality. The latter coal is 6 ft. thick, and finer than we have ever seen it, and the Gubbin Stone is very rich in iron, far above the average. This is curious, as at nearly all the collieries round the Rowley Hills no Heathen coal or Gubbin of any importance has ever been found.

The White Ironstone measures are found below the Heathen coal, and are 3 ft. in thickness. Specimens of these coals and stones were exhibited on the pit bank at the time of the excursion, and were examined with great interest by the visitors. The surface plant is, without exception, the best in this southern portion of the coal field; and Mr. Minton, who is well acquainted with modern mining and the plans in vogue in the more forward districts, has spared no expense to make this place perfect in every respect. There are two horizontal high-pressure winding engines coupled together, with the drum between the cranks. They have been made by Messrs. Withinshaw and Co., engineers, Birmingham, and are strong, nicely proportioned, and give evidence of good workmanship—in fact, no more suitable engines could be obtained, considering the circumstances, for they are economical, and can be kept above their work whatever may be required of them, and this is of great importance for colliery purposes. The steam is obtained from three cylindrical boilers, and the water is forced into these from a reservoir in a small valley between the hills, by two pretty donkey pumps, made by the same engineers. We speak more particularly of the above engines because they are of the class we have so long advocated and recommended in the *Mining Journal* for the neighbourhood of which we are speaking, and they are almost the first put up in it. Now, however, the advantages accruing from their use can be so clearly seen, and are brought home to the colliery proprietors of the district, there is no doubt they will become more common. The pit frames at these pits are very massive and strong, and have large skeleton pulleys of wrought-iron and cast-iron combined, altogether they are far from being unsightly. Round steel wire-ropes are used, and have attached to them strong cages, each supplied with two decks. Three more wire-ropes go from top to bottom of each shaft, and are used as conductors or guides for the cages. The plant is as yet not thoroughly finished, and the roads are only being driven out in the pits. The visitors expressed themselves exceedingly satisfied with the arrangement of the plant, and especially admired the engines and pit-frames.

In coming to Mr. Minton's pits those of the Earl of Dudley, which were sunk under similar circumstances, were passed, and had time permitted a halt would have been made there, so that a few words upon them will, perhaps, be interesting. These were the first shafts sunk to explore for coal from the Rowley Hills. The Earl's chief agent, with others, held the opinion that coal in some state or other existed under the whole of the space covered by the above hills, and this he determined to prove, with what success the sequel will show. Round the tops of the pits there are large quantities of basalt *in situ*, but none whatever was met with in the shafts. The depth to the Thick coal is 232 yards; on approaching this measure large quantities of explosive gas were given off, and it was found to be very inferior, and anthracitic in nature. Two horizontal beds of injected Trap were found in the Gubbin and White Stone measures. These are very much altered, and to such an extent as not to be worth getting; there is also no Heathen coal. The Thick coal is very much contorted, and great difficulty is experienced in following it, but yet large quantities of good quality are continually being raised.

From the Grace Mary Colliery the party were conveyed in their vehicles to the Earl of Dudley's Ramrod Hall Colliery. Here there is the finest specimen of the parent seam of Thick, or Ten-yard, coal left in the present South Staffordshire coal field, and there is over 100 acres of it lying as even and undisturbed as it is possible for it to be. The visitors descended the pits at one of the principal plants, and were told that eight miles of gate-road were driven out from this one pair of shafts. Upon arriving at the extensive workings coloured fires were occasionally lighted, and showed to perfection the large vaults hewn out of the solid mass of carboniferous matter. The excavations are extensive as the rib and pillar system of working is adopted. On ascending to the pit bank the party found refreshments, in the shape of wine and biscuits, awaiting them; and when they had partaken of these they at once proceeded to the carriages, and were taken to the mouth of the tunnel belonging to the Birmingham Canal Company. This tunnel, which is one of the finest works of its kind in existence, passes under the Rowley Hills, and unites the East Worcestershire and South Staffordshire sides of the coal field. It was driven in 1856, is 1 mile 5 furlongs 140 yards in length, has a water-way sufficient for three boats to travel abreast, with a towing-path on each side, and is lighted with gas from end to end. Its cost was about 200,000*l.*, and it not only proved a boon to the district, by providing easy transit for its produce, but as no basalt was encountered in making it, almost undoubted proof was given to geologists that coal existed in this hitherto unexplored region; and this fact, with others, led to these enterprising sinkings of which we have been speaking.

The Canal Company had placed at the disposal of the visitors their small steam-packet and several boats, provided with comfortable seats, in these we were conveyed through the tunnel, which was brilliantly illuminated with gas, and candles placed on each side about a yard apart its whole length, and in addition to these coloured fires were continually thrown out from the leading boat. The effect, we need scarcely say, was magnificent to the extreme, and the party gave strong evidence that they appreciated it, for time after time cheers for Mr. Hancox, the engineer of the company, who had conducted the arrangements, were pealed out from the heavily laden boats. The continuing pleasing sights had their effect also upon the spirits of the company, and being afloat they felt nautical, patriotic, and loyal, for such songs as "Rule Britannia" and "God save the Queen" echoed through the spacious vault.

Having emerged from the tunnel at the opposite end, all speed was made to bring the party to the next place of interest to be visited, and in a few minutes the visitors in small parties were descending Messrs. Dixon and Bourne's limestone pits, at Dudley Port. Many exceedingly interesting things and places had been seen throughout the day, but here was the crowning point of all. Stepping out of the cage at the bottom of the pit a truly grand sight was opened up to our view, for we stepped into a lofty cavern, in dimensions resembling Regent-street, London, and studded all over with candles shining out from the greyish-green background of the limestone like stars. Here and there the candles were arranged in appropriate motos of welcome, and small pools of water, occasionally met with, were all surrounded with these lights, all tending to make up a scene that can scarcely be described. The visitors were under the guidance of Mr. Bristow, the manager, and Mr. David Peacock, the mining engineer, and as they were conducted through these extraordinary excavations, of which there are eighteen acres, all supported on pillars, fresh sights kept greeting our eyes. Right and left opened out fresh caverns, all illuminated with candles, and now and again coloured fires shone out from the backs of the pillars, leading us to exclaim—Surely this is the nearest we can approach

to those imaginary fairy regions. The visitors could not repress their feelings of wonder and astonishment, and continually cheered the efforts that had been made for their entertainment. In the centre of one of these Silurian caverns a splendid luncheon was spread, and to this the large number of visitors sat down, and thoroughly enjoyed themselves. Mr. R. H. Smith presided, and several toasts were drunk with heartiness. This finished one of the happiest excursions it has been our lot to accompany.

EXPLOSIONS OF GAS IN COLLIERIES—No. II.

SIR,—No doubt great improvements have been made in mine ventilation during the past few years, and the gross quantity of air put into circulation has been very much increased in a majority of cases. This has been effected sometimes by applying fans and other mechanical contrivances, and in other instances by employing large furnaces, and enlarging the air-ways very considerably. Looking at those facts, it appears to be a natural deduction that those appalling occurrences would become less frequent, and this is no doubt the fact, if the quantity of coal raised and the number of hands employed were fairly taken into account. But still most awful explosions do occur, which may possibly be accounted for by some of the following considerations:—We may with reason hold that the total quantity of air put into circulation at any given colliery ought to bear a definite proportion to the quantity of coal to be raised and hands to be employed, as the number of districts to be opened and splits to be employed ought to be in proportion. If we attend to this it will appear to be quite feasible that a colliery where 100,000 cubic feet per minute is in circulation may be much less safe than a less work where only half the quantity is circulated, supposing that the seam is of the same thickness, and all other circumstances are equal. Therefore, the gross quantity of air in circulation is no criterion by which we can judge of the safety of a mine. As the strength of a chain cannot be more than the strength of the weakest link in that chain, so the safety of a mine depends—first, on the total quantity of air put into circulation, and the permanence of the power employed to effect this; and, secondly, on the proper distribution of the air into columns, so as to render every part of the mine safe.

It may reasonably be doubted whether the safety of mines has been increased in proportion to the increased or improved ventilation, as the demand for increased quantity of coal to be raised, to a certain extent, has a tendency to prevent this very desirable result. We may, therefore, conclude that if those general rules or principles are not attended to, and a coal seam produces any considerable amount of inflammable gas, an explosion is very likely to occur at some time, unless safety-lamps are exclusively and very carefully used. But if the best regulations are made, and lamps are not used, or are only partially used, explosions need excite no surprise, and especially where a thick seam is met with. The working of a seam 9 ft. in thickness, and producing gas freely, is a most serious undertaking, and one that will tax to the utmost the ability and energy of the most experienced mine engineer. Such a seam can, no doubt, be worked by means of safety-lamps, presuming that the ventilation is sufficient for all ordinary purposes, but if the coal cannot be got down without blasting the risk of explosion from this cause is certainly not trifling. The machine for breaking down the coal, lately introduced by Mr. Bidder and others, was expected to supersede the use of powder, and it has, I believe, been very successful where it has been tried; then, why not adopt it, and thus avoid all danger of explosion from this cause?

As I noticed in my former letter, miners will insist upon having sufficient ventilation to enable them to work with open lights, but I submit that they have not gained a comprehensive view of the subject, otherwise they really would be a little more cautious. It should be seriously considered that in dealing with such a subtle foe as pit gas we are always, to a great extent, dealing with an "unknown quantity," for if we examine every part of a mine, and find that all the districts are well ventilated, and quite free from accumulation of gas, we only know that the ventilation is sufficient at that time, and the discharge of gas may increase at any moment. A sudden discharge of gas may, indeed, occur, which may render explosive a considerable portion of the air current in a very short period of time. I have not yet made any remarks about blowers, or sudden discharges of gas; they are, perhaps, the most mysterious occurrences connected with coal mines, but one would suppose that if a mine were known to be liable to such discharges this consideration alone ought to forbid the use of open lights. I propose to make some remarks on blowers in a future letter.—*Newcastle, Sept.* 26. M. E.

SAFETY TO MINERS—A CHEAP MODE OF OBTAINING INCREASED VENTILATION.

SIR,—Will you be so good as to give place in the Journal to the following remarks, written with a view of eliciting the opinion of practical men on this important subject?

The fatal explosion at the Moss Pit Colliery, near Wigan, brought to my recollection the plan below described for preventing such evils, which suggested itself to me while engaged in boring operations abroad; but, being absent from England, I was ignorant as to what had been done to avert these evils up to the present time.

In order to facilitate the escape of gas in the seam of coal being worked, as well as to ensure a more certain supply of fresh air than hitherto obtained, for which purposes the present system of employing only two shafts is totally inefficient, I propose to make borings where needed, and particularly in advance of the workings, in the seam of coal that is being mined, of sufficient diameter, and near enough to each other, to attain the desired end. With the aid of Messrs. Mather and Platt's steam boring apparatus such borings may be made to any depth, rapidly and cheaply, up to the diameter of 3 ft. Some years since, at Middlesborough, near Newcastle, a boring was made with this machine to the depth of 1312 ft., in chalk, flint, and rock, of 22 in. diameter at top, and 18 in. at bottom; the time occupied was 390 days, and the whole depth was without tubing.

This machine will make in favourable strata from 5 to 6 ft. per day of 12 hours, to about 1000 ft. deep, and it is only in loose soil or sand that tubing is necessary, unless it be required to shut out water. Had such ventilators been made in the Moss Pit seam might not the timely escape of gas have prevented the fearful loss of life and property that has taken place? The cost of such borings would have been a mere trifle in comparison to the loss that has been incurred.

Viewing the great annual loss of life and property arising from want of proper ventilation in mines, and that boring ventilators, as above described, may be effected at moderate cost—further, that if a more perfect mode of ventilation be adopted than that now employed, much coal may be worked that lies at too great a depth to be mined by the imperfect system now in use—is it not, therefore, necessary to make it obligatory on owners of coal mines to adopt this or some such improved system of ventilation, fixing by law the maximum distance the first ventilator must be from the shafts, and one ventilator from another? JOSIAH DEACON.

Doddington-grove, Kennington.

ATMOSPHERIC GAS.

SIR,—The approaching long evenings of winter leads to the renewal of the consideration whether nothing can be done to render the general adoption of atmospheric gas practicable, not as a substitute for gas as supplied by public gas companies, but instead of paraffin and other oil lamps and of candles. The inventions which have been from time to time introduced for carburising atmospheric air have each possessed considerable merit, but at the same time each had some trifling defect which prevented its use by the general public; either the apparatus would not work satisfactorily unless a uniform temperature was maintained, or the level of the carburising liquid seriously affected the amount of light given off, or the apparatus was liable to derangement. For anything intended to come into popular use any such defects as these are fatal, for the public will never trouble themselves to ascertain the cause of failure in anything new, although the failure may be due to their own stupidity or neglect.

Under these circumstances it is essential that the requirements of the case should be understood, and the arrangements made accordingly. Of the apparatus best entitled to general adoption the carburiser invented by the Rev. W. R. Bowditch, of Wakefield, should be mentioned as the most philosophic. He recognised the fact that with the carburising liquids generally at disposal it was essential to keep them warm in order to ensure their vaporisation. To this end he placed his burners beneath (at a fixed distance) his chambers containing the carburising fluid, and in some cases the arrangement worked admirably, but it was a mistake to make the distance uniform, because the uniformity of the liquid could not be relied upon, and hence the invention has fallen into disuse; but it is probable that had Mr. Bowditch provided for making the pipe below the chamber telescopic all difficulty would have been overcome, as the heat reaching the bottom of the chamber could have been easily regulated and a good steady light obtained, regardless of the volatility of the liquid employed. In the cases of apparatus of the character of Mongreul's carburator the objection arises from another cause; the liquid used must be very volatile, because the air is carburated at some distance from the point at which it is burnt. The consequence is that there is in the first instance some difficulty in obtaining the fluid, and in the second the fluid is very difficult to deal with, being so extremely liable to loss or deterioration. The temperature has usually much to do with the volatility, and consequently the richness of the atmospheric gas is constantly varying, so that unless the eye be kept continually on the burner the result is not satisfactory, either the air is under-carburised and there is little light, or it is over-carburised and there is too much smoke. From this it would appear that what is wanted is a mode of carburating the air near the burner, and at the same time of regulating the evaporation of the fluid in order that the air may at all times carry a uniform quantity of carbon or hydrocarbon to the burner. WATER-GAS.

ROCK BORING BY MACHINERY.

SIR,—In a letter in the Journal of Sept. 16, a correspondent, signing himself "Observer," under the above heading, states that "no one is more anxious than myself to see this long-contested apparatus brought to a successful issue, and no one more annoyed when I see letters in the Journal on the subject void of the truth"—in proof of which he goes on to state that the machine to which he alludes has been at work in the shaft one month, and then gives the results as compared with the previous month, worked by hand-labour. It happens, however, that the drill was not started to work in the shaft until Aug. 10; it stopped working on Sept. 2, and was brought to bank, when all hands received notice to quit, as the directors wanted to let the shaft on a long contract. Our man, writing us from the the mine, says—"I started the drill on Aug. 10, and since then I have put down 68 holes, 2 in. diameter (although we only profess with the 'jumper' drill to put down 1¼-in. holes), to a total depth of 101 ft. 4 in., in the *hardest flint* in 59½ hours. This is the exact time I have been able to go below from the above date until Sept. 2, as the men have been putting in air-pipes, bearers to carry the pumps, a new slide, &c."

Now, we would ask your readers, in common fairness, if this can be considered to be a month's trial at the bottom of the shaft, more especially by one professing to be seeking in the public interest the solution of the question of rock boring by machinery, and an unprejudiced seeker after truth? Again, "Observer" states that 20 men were employed in each case. This is another unaccountable error, since to move our drill, with stand, from place to place requires at most only three men, and when in position one man alone is required.

In conclusion, we beg to say that we fully sympathise with "Observer's" annoyance at seeing untruthful letters in the Journal, and if he will only send us his name and address we shall be glad to furnish him with proof that he himself has (of course, unintentionally) fallen into that grave error. We will also give him the names of those who have used our drill for sinking purposes, and who can say that the work was done in half the time, and at half the expense of hand-labour. CHAS. BALL AND CO.

Newgate-street, London.

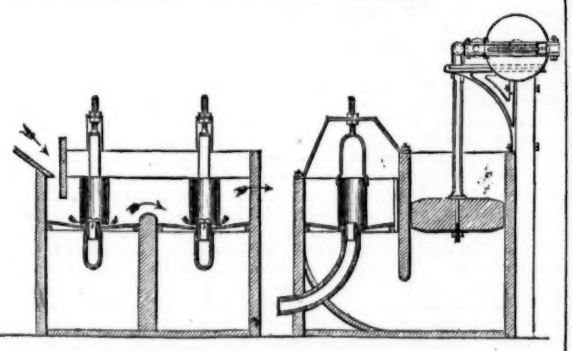
ON THE DRESSING OF ORES—No. XII.

CONTINUOUS JIGGING-MACHINES.—Grains of sand, varying in size from 2 to 10 millimetres, are usually jigged on perforated plates, and separated into three classes—best ore, mixed ore, and waste. In this system of jigging the ore does not pass through the perforations into the hutch, but traverses the plate, and is continuously discharged through an opening left for this purpose. In order to collect the ore resulting from rich or poor stuff, within a given period, the opening is furnished with a regulator, which is also essential for securing the proper flow of coarse or fine grains. No separation of ore from its gangue can be properly effected, unless the grains are correctly sized. For simple ores the trommel may be arranged so as to deliver 10, 7½, 5, 3½, and 2 millimetre stuff; but for complex ores and minerals, of nearly equal specific weights, a closer subdivision will probably be desirable. Most continuous jiggers are formed of loose forcing-pistons and fixed sieves, but Rittinger, in his exhaustive work on ore dressing, shows certain valvular piston arrangements, set under the sieve bottom, as well as movable sieve-frames, both continually delivering ore and waste sand.

The movement giving to jigging pistons has received great attention from the Prussian engineers, for large-grain stuff Kley's disc and link arrangement is extensively used, and for fine grain sand his shifting or adjustable eccentric. With a group of continuous coarse sand jiggers I have advantageously employed rocking shafts, the driving gear being contrived so that the initial movement may be readily shortened or lengthened, or if alteration here is not desirable that the stroke of any one of the pistons may be varied within itself. To obviate the necessity of leather belting in driving fine sand jiggers, I have also used a main shaft, geared into short counter shafts, properly speeded, and carrying slotted discs, the diameter of the discs being sufficient to give a stroke ranging from zero to three inches.

The quantity of water required in continuous jigging is much greater than that wanted in non-continuous jigging. In the former sufficient water must be given to progress and discharge the stuff according to its volume, specific weight, and richness. The water for this purpose may be added either above or below the pistons; and instead of cocks, simple launders may be employed, having discharge holes regulated by slips of iron plate.

The volume of stuff which can be dispatched by a coarse sand-jigger will depend upon the size and composition of the grains, but 1 ton per hour is not an unusual quantity, although for practical purposes it will be safer to limit it to two-thirds of this weight.



COMMERN JIGGER.—Fig. 1 shows longitudinal and cross sections of a continuous jigger employed at the extensive lead mines situated near Düren, Prussia. It consists of two compartments, two sieve bottoms, and a corresponding number of pistons. The sand passes from the hopper to the sieves, when it is jigged into best and seconds ore, which flow through pipes set in the centre of each sieve. The top of the delivery pipe is fitted with a short piece of small tubing, which in turn is surrounded by a sheet-iron cylinder, which can be raised or brought close to the sieve bottom. This small pipe and cylinder form the regulator, and can be adjusted so as to divide the ore from the sand, whether the vein-stuff be poor or rich. Each sieve is 2 ft. square, divided by a partition 4 in. thick. The short tube inserted into the delivery-pipe is 1½ in. diameter, the annular cylinder is 6 in. diameter, and 12 in. long. The wooden pistons are 8 in. thick, furnished with piston-rods 3 ft. long. The outside dimensions of the hutch are—length, 4 ft. 9 in.; width, 4 ft. 8 in.; height of piston-box, 3 ft. 10 in. The planks forming the sides and ends are 2½ in. thick.

UTSCH'S JIGGER.—A cross section of this apparatus is shown in

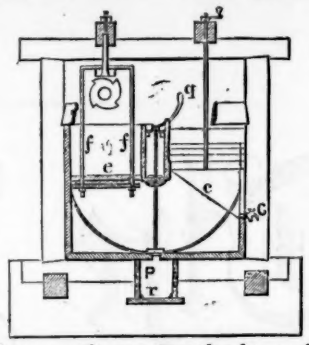
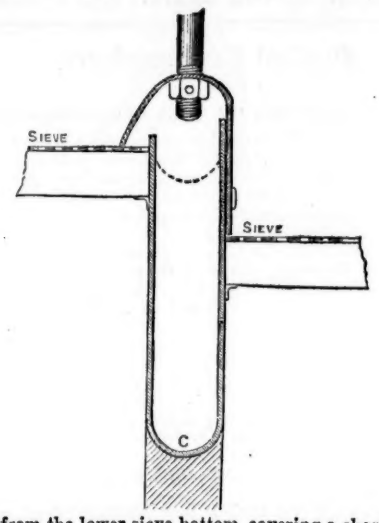


Fig. 2. The piston, *e*, carries a rectangular frame of iron, forming the piston-rod, *f f*. The hutch is discharged into launder, *P*, by lifting the valve handle, *g*. The ore passes from the end of each sieve into a chamber, the inclined bottom of which is shown by the line, *c*, and is from time to time drawn off by opening the cock, *C*. Three pistons and an equal number of sieves form one jigger. The width of each sieve is 26 in., length of first sieve bottom 22½ in., length of second and third bottoms 22 in. The pistons are worked by cams, set on a common shaft.

At the end of each sieve bottom a regulator is fixed, shown on an enlarged scale in Fig. 3. It consists of a sheet-iron movable cap,



4 in. high from the lower sieve bottom, covering a chamber 1½ inch wide. By raising or lowering this cap a greater or less quantity of stuff will be discharged into the chamber within a given period, and by the same means will its richness or poorness in metal be modified, either for the ore heap, or for reduction and subsequent treatment.

2, *Coleman-street-buildings.* JOHN DARLINGTON.

MAGNETISM OF IRON SHIPS.

SIR,—At a time when the greater portion of our coasting and foreign trade is carried on by means of iron ships and steamers, and our dockyards are full of iron vessels in process of construction to absorb the remainder, and sweep the rest of our wooden-built fleet off the face of the earth, it cannot be out of place to draw the attention of the public to the culpable negligence of a large portion of our mercantile marine officers in regard to the "theory of magnetism," a proper understanding of which is absolutely necessary for the safe navigation of an iron ship engaged in any trade where there is much change of magnetic latitude. Sir William Thomson, at the late meeting of the British Association in Edinburgh, expressed the opinion that it was entirely owing to the thoroughly scientific method adopted by the Admiralty that no ship of Her Majesty's navy had ever been lost through compass errors. This opinion anyone that is at all acquainted with the subject will most fully and freely endorse. It is, therefore, to be deeply regretted that so little attention has been paid to the result of the labours of Captain F. J. Evans, R.N.; Archibald Smith, F.R.S.; and J. G. Towson, F.R.G.S., who have so ably and thoroughly expounded the subject, so far as it is connected with the analysation of compass errors, the computation of deviations, and the adjustment of compasses in iron ships. It is not very flattering to us, as a great maritime nation, to be compelled to acknowledge that the greater portion of our commercial fleet is given up to a mechanical process, by which their compasses are adjusted for these latitudes, and the remainder is left to the ingenuity of the officers in command, many of whom are entirely unaware that such a thing as a magnetic chart is now published, for the purpose of supplying elements which, taken in connection with a proper analysation of a ship's magnetism, will enable them to compute beforehand the changes of deviation that will take place on a voyage round the world.

Sir Wm. Mitchell, in the *Shipping Gazette*, has, however, sounded the keynote of reform by advocating the compulsory record of deviations on the cardinal points of the compass before an iron ship is permitted to leave the United Kingdom. It would be perfectly amazing to the uninitiated to known what a vast amount of information those few figures could be induced to reveal. It is my humble opinion that, if this had been done long ago, a new light would have been thrown upon some of the strange and unaccountable casualties that have involved the underwriting associations of our country in frequent and heavy loss. Many will, no doubt, in answer to my remarks, point with exultant pride to the wonderful success that has attended the magnificent fleet of iron steamers that constitute the Cunard line; but, if we simply inspect a magnetic chart, and follow their great circle track across the Atlantic, we shall find that their course is nearly upon a parallel of magnetic latitude; consequently, when once their compasses have been carefully and accurately adjusted, the change of deviations of this particular voyage will be very small. It is quite an open question whether they would have been more free from accident than the Quebec line if upon their arrival on the western side of the Atlantic they had been continually called upon, during the unsettled and speculative stages of compass deviations, to run the gauntlet of the rapid changes of magnetic latitude from hence to Quebec. It is not my purpose to make any invidious comparisons between the officers of these large and enterprising companies; no one can entertain a higher respect for them than myself; and since the question of a ship's magnetism and its effect upon the compass has been fully demonstrated, there is no real reason why the Allan line should not anticipate as brilliant a future as the long-established and world-renowned Cunard Company. In order, however, to show the difficulty that has attended and still attends the navigation of iron ships where the officers are dependent upon home adjustments, and the different devices that are intended to do away with computation, we will select, for simplicity and brevity, the case of a ship leaving the United Kingdom for Quebec, whose compasses are properly placed, whose magnetism has been resolved, and the value of the co-efficient B (which constitutes the principal changing quantity), consisting of 9° of ÷ B, composed of 6° arising from permanent magnetism and 3° from vertical induction, in vertical iron. In the Gulf of St. Lawrence the 6° from permanent magnetism would be found to change according to the ratio of 1 to 1·5, or 9°, the 3° from vertical induction would increase in the ratio of 2·5 to 4·7, that is, to 5° 40′, and the whole value of B in the Gulf of St. Lawrence would be 14° 40′. C is also a changeable quantity, and as it is also

the co-efficient that is principally affected by heeling, it is, therefore, essentially necessary that its value should be carefully computed, especially when a ship is in close proximity to the land, and heeled over by the wild fury of a storm. By reference to the Warrior's heeling deviations, we find that C changes in that ship 20° 2′ in 15° of heel; but, lest any undue importance should be attached to the fact that the Warrior is an ironclad, we will refer to the table of heeling deviations for the steamship City of Baltimore, and there we find a change of deviation of 18° 30′ for 10° of heel, or 18° 30′ × 15 ÷ 10 =27° 45′ for 15° of heel upon a north course. Trusting these few facts will tend to impress upon officers of the mercantile marine the necessity of studying this subject thoroughly, in order to emancipate themselves from a dependence upon instruments that are only good for fine weather when the sun and stars are visible, and that supply them with no clue for the computation to errors in stormy weather, I now leave the subject for their careful consideration. E. C.

Glasgow.

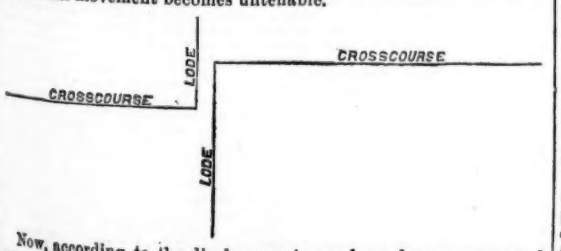
THE INFLUENCE OF CROSS-COURSES AND FAULTS ON METALLIFEROUS VEINS.

SIR,—The investigation of subjects through the medium of the Journal like that submitted by your correspondent Mr. T. A. Masey, in the Supplementof July 15, is a popular and effective method of propogating, and therefore increasing, the general stock of important practical mining knowledge. The properties of lodes will always be regarded as of primary importance in mining, but next to that the character of the country rocks, and the cross-courses and faults which traverse them, will be esteemed. Such distinctions, it may be observed, whilst conventionally necessary, are almost, if not altogether, distinctions without a difference, inasmuch as the properties of lodes, and the character of the country rocks and cross-courses, are corresponding conditions of the same thing—simply the relation of cause and effect.

By what operations of law the direction of displacement of metalliferous and other veins is determined cannot at present be satisfactorily explained, if at all comprehended; notwithstanding it is difficult to conceive a theory illustrative of this phenomenon without embracing the respective angles of the intersecting and intersected veins, as contributing in some manner to the effects produced. But on reflection the promptings to such a conclusion is weakened, and finally dissipated, by its not being in accordance with the deductions of reason. Besides, the facts of experience oppose it. Mr. W. J. Henwood, as appears by his book, "Metalliferous Deposits of Cornwall and Devon," applied himself specially to an investigation of that phenomenon, and after a personal examination, extending to hundreds of instances, of each class of dislocations—those to the greater and those to the lesser angle, as well as those to the right hand and to the left hand respectively—found that the preponderance in either case was too trivial to be of any service as a guide to the miner. There was a small majority, it is true, but in favour of which side I do not now remember, but the author concluded by saying that no reliance could be placed thereon, because the discovery of a new district, or an extended examination of existing ones, might very probably change the balance.

In applying established local rules to new districts several collateral circumstances have to be regarded, which should be well weighed and sufficiently understood, otherwise important differences may exist, and determine unobserved the direction of the displacement. It is well known that neighbouring cross-courses in a mine, by differing but a few degrees in their strike or bearing, heave respectively the same lode in opposite directions, one to the right, the other to the left, but both to the same general angle, the greater or lesser according to that prevailing in the district, or immediate locality. I incidentally submitted a theory, which was published in the Supplement to the Journal of May 6, tending to show that in many instances the sectional conditions of metallic and non-metallic veins were sometimes due to different and widely dissimilar causes, by one of which the actual displacement of lodes, and the entire masses of rocks in which they were contained, occurred, whilst by the other no displacement had ever within the limits of possibility, determinable by human reason, have taken place. It does not appear, however, of so much importance to mining as to whether the sectional conditions of lodes, as well as of cross-courses, are produced by actual force, mechanically applied, or are merely apparent displacements, the result of an entirely different agency. But the intersections of crossings or conjunctions of veins, if not the irregularities occasioned thereby, are of inestimable value. The knowledge of natural laws without a knowledge of the effects of such laws in operation can be of no benefit in their application to mining, and can consist of nothing more than mere abstractions, to be classed with nothing better than unapplied theories.

The knowledge that cross-courses and faults are channels of wealth, contributing largely, but not exclusively, to the productiveness of metallic lodes, is the result of experience and observation. Metalliferous deposits were found to prevail in the vicinity of cross-courses and faults before it was even conjectured that the intersecting non-metallic veins were the channels mainly through which the metals and metallic minerals were conveyed in a solvent condition to the fissures—elementary or embryonic though they may have been, and probably were, at the earlier or incipient stages of their progress and development. The theory that lodes and cross-courses of the same series are of different ages is, in my opinion, purely a presumption, and can in no case be mistaken for a deduction of scientific research and observation. The idea that a vein which intersected others with which it came in contact was of an age antecedent to them leads inevitably to the conclusion that all dykes, of whatever kind—whether of igneous or aqueous origin—are alike ejections or projections from some hidden subterranean source, sustained by an energy of which the mind of man can form no rational conception. But if we admit that all dykes are projections or ejections from an interior receptacle it would not remove the difficulties nor answer the objections which beset the theory, for in what way could that account for the shifting of the entire mass of rocks on one side of its own channel—the cross-course—and that, too, in a direction lateral to the propelling force from within or below? The forcing of matter through such well-defined channels as our cross-courses are known to be presupposes the pre-existence of the channels themselves, and that the direct action of the forces, &c., exerted in propelling such a body and weight of matter upwards was insufficient to disturb or distort the stratification and cleavage of a material so fragile and apparently so well adapted to be affected by such actions as clay-slate. Yet at the same time, and lateral to the action of the forces exerted, we are told that the movement of masses of matter, forever beyond the power of numbers to express in might or magnitude, occurred. The probability is that wherever any movement has occurred in any sections of the earth's crust the cross-courses, slides, flookans, and faults pre-existing aided such a movement, and that without which no such movement could ever have taken place. What can theory advance in opposition to physical facts, an illustration of which I give in the annexed diagram, and occurring at the Mount Vernon Mines, at this place, from which it will be seen that both the lode and cross-course are heaved—in miners' parlance—the former 2 feet and the latter 10 ft.; and when it is added that the line of displacement in both instances is towards the adjacent hills, the theory of this actual movement becomes untenable.



Now, according to the displacements, we have here a compound movement, and the question to be determined is by what agency was it effected? If by force—the application of power—that force or power must have been independent of both lode and cross-course, and exerted from a point exterior to either. It seems to me that such a phenomenon as the diagram discloses is utterly irreconcilable with all conceivable ideas of effect which may be produced by mere mechanical agency. But by whatever agency it may be effected, its effects are most salutary to the lodes and beneficial to mining.

The "sections" to which your correspondent referred of the Old Treburgett Mine exhibits a condition of things replete with interest to the miner, and equally important to mining. The two main cross-courses, as shown by the diagram, dip in opposite directions, the northern one dips northerly, at an angle of about 60°, and the southern one southerly, at an angle of about 72° 30′, showing a difference of 12° 30′ in their dip respectively from the horizon. The dip of the two main cross-courses in opposite directions gives to the intermediate sections of ground the appearance of a frustrum of an anticlinal axis; and if it were so, and vertically projected, and the respective cross-courses were ascertained to incline to each other, either in an easterly or westerly direction—no matter which—the dislocated parts of the lode, if separated laterally from each other, ought to be found on the opposite sides of both cross-courses at the lesser angle, which would necessitate a search being instituted to the right hand in one instance, and to the left hand in the other—that is to say, if the "vortex" of the approximating cross-courses was to the east, in the case of north and south lodes, then the counterpart of such lodes would, probably, be found on the opposite side of each cross-course in an easterly direction, which would be consonant with the action and mechanical effect of an axis projected between two approximating cross-courses. But if no mechanical movement of the strata occurs *en masse*, either by projection of the axis from internal pressure vertically exerted, or, what amounts to the same thing in effect, subsidence of the strata contiguous to it, then the effects predicated of such a condition of things must not be inferred from any other. The southern part of the Old Treburgett sett seems to be wrapped in mystery, yet no one, I think, can doubt but that the missing part of the lode is there; and though the cross-course may be nothing more than auxiliary to the separation of the lode, the line of its strike or bearing must be referred to as a guide to the direction in which the lode may be found, and that, again, to the angle of intersection at the other cross-course and the line of displacement, if ascertained, occurring there.

There is one other matter which may be mentioned in connection with this subject before I conclude. Cross-courses are sometimes so large, and carry so large and well-defined flookans on either wall, and at the same time their intermediate parts are so hard and compact as to be mistaken for the ordinary country rock, and the flookans on either side taken to represent the whole cross-course, and, consequently, the miners search for the missing part of the lode to be conducted on the same side of the cross-course as the part of the lode on which his operations had previously been conducted, and hence frequently his embarrassment and want of success. R. KNAPP.

Ellsworth, Nye county, Nevada, Aug. 30.

WITH WHAT ARE THE STRATA ABOUT PRODUCTIVE COPPER LODES MINERALISED?

SIR,—I remember seeing in your valuable Journal some time since a very interesting letter from Mr. N. Ennor on the above subject. In that letter he asked professional men to analyse the strata adjoining lodes, and inform the public of their contents. I carefully read Mr. Ennor's remarks, and have since watched the Journal for some professional geologist's reply, but I have seen none, and the old repetitions in mine captains' reports continue as usual. They say the strata are highly mineralised, but not one tells us with what mineral, and I cannot see any good result from any of these lodes, notwithstanding such favourable predictions of them.

Having had 30 years' practice, I flatter myself that I know enough of mines, strata, and lodes to see the great utility of Mr. N. Ennor's suggestion for a correct analysis by a professional man, and it would be a most valuable acquisition, which would be appreciated by the miner and all interested in mining fields—in fact, it must be generally done before the gate can be opened which stops the way to find the grand secret of the law of *ore* deposits.

Practical men know that all strata *are* mineralised, but with what? What the miner and the public want to know is whether it is such as will aid the lode in collecting a large deposit of (say) copper, or whether it is acting *vice versa*. All captains' reports on the mineralisation of strata are a farce, and will ever be so until we are correctly informed what they are mineralised with. We see that the botanist and intelligent farmer knows that trees, corn, and all vegetation are dependent on the contents of the strata and soil, and that a soil that will grow one crop will not grow another in perfection. Recently the best informed of them have been getting the soil analised, as a guide to their future cropping; therefore I am compelled to agree with Mr. Ennor that the same natural law which governs the soil also governs the strata below, and that it must be a universal law that everything grows best in the soil or stratum that contains the greatest portion of substances which will unite to aid them in such growth, to do which nature provides them with a something not generally known to man, thus causing them to unite and form new substances.

These appear to me to be the essential points mentioned in Mr. Ennor's letter. I should feel much interested to see them acted on by our best schol teachers and professional geologists; in fact, the Government should take the matter up, and offer substantial rewards for the best authenticated assay of strata about lodes. They should select, first, six very productive copper lodes, four in clay-slate and two in granite; and six lodes worked to about 100 fms. deep, and which have, from agents' general reports, held out fair promise of being in a mineralised stratum, but which have never produced copper to meet half the expenses. The question would then arise—Is there a material difference between the contents of the strata around the productive and unproductive lodes? If only once a law as to the contents of strata were laid down it would bring hundreds of our first men into the field: the chemist, the professor, and the miner would at once enter to test and criticise its accuracy and its effects on lodes—in fact, it *must* ultimately open the way to bringing England's mineral wealth into the market at a lower price, and enable those who speculate to retain millions in their pockets. It is the working of so many unproductive lodes, from want of chemical knowledge, which has crippled mining. As a proof, let your readers look at the money spent annually in mines in the call paying lists, eight-tenths of which if the strata were truly and chemically assayed would show that they never had a chance of paying anything.

In these assays the water must *not* be lost sight of, and particularly the largest sources, such as is brought in from caunters and cross lodes. Slides and elvans do not generally bring much water, but their contents have a most unaccountable effect in the formation of ore. I some time since came to the same conclusion as Mr. N. Ennor, that no extra productive lode is found if the strata do not contain a something congenial to its growth; and it does appear reasonable that if caunters, cross lodes, slides, and elvans cross the lode in favourable stratum, bringing all the substances required to that point, an extra deposit of ore is likely to be formed. Single lodes, without intersections, if in congenial strata, will produce good ore, and may be termed coaxing mines, but they very seldom pay large dividends.

I do hope that some of England's most able teachers, professors, and chemists will take this subject up, and go into it heartily, so as to enable mining to become less speculative, as I firmly believe that it can be brought to far more of a certainty than a speculation. I will venture to name six productive copper lodes for the first trial—1, the United Mines; 2, West Seton; 3, Devon Consols; 4, Wheal Friendship, all in slate; 5, South Caradon; 6, Wheal Basset, the two last in granite.

In order to carry out this analysis we must take mines now open, and I fear the United Mines contain too much water for the purpose; if so, some other may be selected. The six unproductive ones can be selected after the productive ones have been got through. Care should be taken to show every intersection in these mines, and their bearings, as well as their contents, also their greatest influx of water, and from what direction or source.

I have no doubt if this is taken up, well managed and brought before our metallic mining members now acting on the committee for framing new mining laws, they would at once see the utility of analysing the stratifications about metallic lodes, and use their best efforts to get a Government grant of a few thousands to carry it out. The miners have a right to call on them to do so, although this may be considered a subject that only affects the landlords and adventurers in the mineral districts; it really affects the whole mass of England's millions. In doing this Members of Parliament are only fulfilling their duty to their constituents, in aiding the carrying out such valuable work for the national benefit.

I may notice that the substances composing nearly all the strata are the following:—1, Silica, alumina; 2, sulphur, arsenic; 3, magnesia, iron; 4, lime, carbon; 5, soda, potash; 6, water. This is not a large field to explore, but they are the beautiful specimens of which God formed a world.

All practical geologists know about how many layers of rock hoop this globe to as great a depth as has been seen; then let us discover how many of them contain metallic deposits sufficiently large to pay for working (I say only four or five), and what layers are there that pay above the mountain lime rock for any metal except iron, although every layer contains a portion of iron, as it is the earth's natural cement. I ask this, as it may be compared with the contents of metal-bearing rocks below, when we get their true analysis, as one class produces paying mines, and the other does not.

The native place of many of the before-named substances is not in the lodes. They originate in the stratum, and pass from it in atoms to join other substances in lodes, when they unite and form ores: lodes are only their places of deposit, and are deposited in the same way as the hard stones in fruit on the trees. If the strata about a lode contained *no* sulphur would there be any yellow copper formed in the lode? If not, that is sufficient to prove the utility of mining men knowing the contents of strata.

One other grand point to be taken into account is—What has electricity to do with forming ores? Mr. Ennor says it is the life of all creation, and no ore can form without it. JAMES PAYNE.

CALCINING TIN ORES—UTILISATION OF SULPHUR VAPOURS.

SIR,—As it is the rule now of our manufacturers to utilise, as far as possible, all waste products, I think it behoves the mining community to follow their example, and see there is nothing thrown away that can be made remuneratively useful.

There is one product to which I wish to call attention, that is the large quantity of sulphur escaping from the calcination of tin ores. I know of one mine where there is calcined 200 tons of stuff per month, which will produce from 25 to 30 per cent. of sulphur, and this instead of being utilised escapes through the chimney, and does great damage to the lands surrounding. Surely there is some cheap method of turning this sulphur to account.

I should be glad to hear what some of your chemical correspondents' views are on this subject. J. B.

CHINA CLAY THE STAPLE MANUFACTURE OF CORNWALL.

SIR,—No one can pass over the line of Cornish Railway without being struck at the picturesque and well-adorned locality within a circuit of two miles from the station at St. Austell. The broken and varied aspect of the immediate neighbourhood, especially on the west side of the town, forms a small part only of the attractions to which I refer, for the whole has been invested with charms to which Nature alone is but subsidiary. The elegant and tasteful villas—or, rather mansions—which stud the neighbourhood are no less evidences of refined taste than of the ample means of their fortunate possessors. The ample spaces on which they stand, the well-kept grounds, and the substantial edifices, all beget the most favourable impressions of the locality. I knew St. Austell, not many years since, when it trusted for its adornments to the lavish display of natural scenery which surrounds it, when the inhabitants were well-to-do people, unsophisticated by the modern desire to look as well as to be well off. I blame not the modern taste, I only draw attention to it, and in the little I may say applaud rather than condemn.

The substantial character of the edifices to which I have referred will not, I hope, be disputed when I say that nearly all of them are built of *clay;* the foundation of every one of them is nothing but *china clay*, and the rest of England has yet a lesson to learn how to utilise the same material to found elegant homes for themselves and families. It has been done here so quietly, with so little demonstration, with no speculative risk, that one wonders that it can have been going on under one's own eyes, and so few comparatively have been made the wiser for it.

The staple manufacture of this part of Cornwall, and how profitable it has proved let the spot to which I point bear its own testimony. The demand goes on steadily increasing. The use of china clay in some form or other seems to be essential to a countless number of manufactures, and there is scarcely a country in the world but what has an increasing demand for it, while the supply, open and palpable, seems practically inexhaustible. I hear of one company, whose shares at most have cost 25*l.* in actually invested capital, being now out of the market, and unobtainable at less than four times that amount. A thousand 25*l.* shares worth 100*l.* within ten or twelve years! This company, I am told, sends off about 100,000 tons per year, mostly china stone and china clay. Of course, we do not hear much of the less fortunate dabblers in clay, which no doubt proves to some miry and deceptive. Though that may be, it can only happen as the result of all but wilful negligence, or no less culpable ignorance, for all is visible, all can be tested, seen, and handled. There is no searching for lodes which, when found, may prove worthless; but the entire work is a plain and legitimate industry, subject only to the misadventures which beset all human intentions.

It is my intention now only to direct attention to what is doing in this locality. I shall, with your permission, recur to the subject, showing how prosperity has been achieved, and pointing out the essentials of such successful enterprise.—*Sept.* 27. PORCELAIN.

THE SCIENCE OF INVESTMENTS.

SIR,—The history of trade and commerce, as well as the history of politics, have their analogy. There have ever been throughout the present century periods and epochs of growth and expansion, as well as decade after decade—the disappearance of little traders and merchants, and of little States, with the steady rise and gradual growth of gigantic firms of merchants, producers, and manufacturers, as well as of great and powerful nations. In trade and enterprise we see the same tendency all over the world. Workshops, factories, and marts that 25 years ago would be considered "great" now rank as small. Of course, the progress of associated capital, in the form of joint-stock companies, has intensified and accelerated the movement, aided to a great extent by the creation of railways, telegraphy, and cheap postage. In politics the modern tendency is clear enough. Where there were many petty Italian States, and many scattered German Principalities, there is now one Italy and one Germany. Political "England" and political "Russia" represent many nationalities, and across the Atlantic the struggle for disintegration has resulted in a victory for "a great, united, and aggregate State."

The spirit of combination in England is peculiarly exemplified in regard to every description of home enterprises, and especially apparent in respect to the mining interests; and although I do not desire to damp the progress and extension of *bona fide* and practical mining operations, yet I must observe that there is a wide difference betwixt the expenditure of capital in legitimate mining and the construction of colossal companies of 100,000*l.* to 150,000*l.*, and 200,000*l.*, or (say) 300,000*l.*, expended in actual "mining." The public can get little profit out of the "produce" of these mining companies as an investment, for the "gains" are already discounted in the premium demanded for the concession of the properties. As a rule the investing public should avoid these undertakings, as they are generally of a speculative character, and the market prices of shares are regulated solely by the operations of "jobbers" and "brokers," who deal on the surface currents of the moment, and the "quotations" are no longer maintained than the public can be influenced to purchase on the faith of increased "premiums" on their already speculative values. In fact, so long as "two" purchasers can be found

to "one" seller the price is maintained, and will probably advance. In addressing myself to investors, and not speculators, it may be as well to remark that the mania for "gambling," which ended in 1865-6, and brought about the collapse of railway contractors, and when finance companies burst up, and light was let in upon the nominal instead of real value of loudly advocated, though rotten, undertakings, nobody would invest another penny, and instead of projecting new enterprises most of those in existence had to succumb, whilst those that now survive are stripped of all their artificial trappings, and can be purchased at prices to pay the investor 8 to 10, and even 12½, per cent. interest. It is to this class of property that I would draw the attention of the capitalist, and especially of the uninitiated. There can be little risk incurred in making a selection of five or six dividend mines that pay 10 per cent. dividends, and which are all but undealt in upon the London market, and of embarking into sound, progressive undertakings that embody the true elements of success; and yet, not being fancy "market" mines, the value of the entirety range only from 10,000*l.* to 15,000*l.*, or (say) 20,000*l.* The investor should look out for sound properties, and let the speculative undertakings that are floated at 100,000*l.*, 200,000*l.*, and even 300,000*l.* to market dealers and jobbers; the investor should look to the future, whilst the class of gentlemen referred to pay respect only to gains on dealings for settlement on the fortnightly "account day," for the intrinsic value is not of the slightest importance to them.

R. TREDINNICK,
Consulting Mining Engineer.

Crown-court, Threadneedle-street, London, Sept. 21.

PRACTICAL MINING—TRIBUTERS' ORES.

SIR,—In reply to "Average Stater," I beg to say the statement of calculations rendered by you in the Supplement to the *Mining Journal* of Sept. 16 is quite correct. If "Average Stater" will take the trouble to check, by Mr. Jehu Hitchins's tables, the standards and prices referred to he will, I believe, find the said calculations pretty nearly correct, provided he leaves out the odd farthings, &c. The total quantity of fine copper in the public parcel in question (39 tons 7 cwts. 1 qr., of 6 produce) is 2 tons 7 cwts. 0 qr. 24 lbs., or (say) 2·3607 tons. The total quantity of fine copper in the five tributers' lots comprising the 39 tons 7 cwts. 1 qr. parcel is (say) 2·533 tons, leaving a margin of ·1726 tons to be accounted for, which, by Mr. J. Hitchins's tables, is covered by the decrease, as shown in last week's Supplement.

I shall be glad to hear the particulars of the tables in course of publication, and hope the results given therein will be satisfactory to both mine adventurer and tributer.

B. S.

Sept. 27.

MINING IN CARDIGANSHIRE—WEST ESGAIR LLE.

SIR,—In last week's Journal, under the head of "Mining in Cardiganshire, I noticed a letter signed "Observer" (Devil's Bridge), commenting in no very complimentary terms on the West Esgair Lle Mine, and I shall feel obliged if you will allow me to reply. Your correspondent premises by stating that "this mine has been very prominent before the public during the last few months," implying, I imagine from the general context and spirit of his letter, that it has been unduly praised, and made to appear what it really is not. Now, having been connected with this mine since the formation of the present company I can safely assert that it has been advertised very little; and beyond the weekly report of the agent in your Journal, which is customary in all mines, I know of no medium where any notice is taken of us and our doings.

Your correspondent refers to a comparison, made in the Journal of Sept. 16, of the West Esgair Lle to the Frongoch (by whom written I know not), but to this I simply reply that the directors have no aspirations to compete with the labour at present, whatever *their* returns may be, and if we approach their 120 tons per month by the close of 1872 we shall not be dissatisfied.

I know nothing of Nanteos Consols or Cardigan Bay Consols, but as Chairman of West Esgair Lle can confidently assert that nothing has emanated from the office of the company tending to give the public a false impression as to the state of our mine. I have lately seen the mine myself, and have no hesitation in stating that the local opinion of our prospects is a favourable one; and if "Observer" will but descend from his Satanic elevation, and look upon us and our doings from a more congenial locality, *he* may possibly become a proselyte, and if unable to say anything good, will at least refrain from forebodings of evil. In the meantime, far from anticipating any such catastrophe as that hinted at, we are quite content to "await the result" with complacency and confidence.

Sept. 27. GEORGE J. HAMILTON,
(Chairman of the West Esgair Lle Mining Company.)

MINING IN CARDIGANSHIRE—MYNYDDGORDDU.

SIR,—You will allow me to correct "Observer" in his remarks, in the Supplement to last week's Journal, on this mine? Supposing, first, that his assertions as to the lode being the Hafon and Henfwich is correct: no one ever read before that from this source did Sir Hugh Myddelton derive his profits, so as to have commenced the bringing in the New River to London. The profits so derived were from the Old Cwmsymlog, now East Darren, which vein is 3 miles to the south of Mynyddgorddu. The Hafon and Henfwich was never worked by Sir Hugh Myddelton, but Mr. Sheldon raised some ore there—I should say altogether, judging from the refuse heaps, 1000 tons may have been raised. Then as to the same vein having been the cause of Mr. Bushel lending King Charles 50,000*l.* Whoever read of this? It is certainly stated that Allt-y-Crib, 3 miles to the north of Mynyddgorddu, yielded ore sufficient to lend King Charles 40,000*l.* The surface deposit at Mynyddgorddu is nothing new—several such have been found. One at Llety Evan Her (now one of the Vaughan mines), at Bronfloyd, and in the Talybont district; and let us hope Mynyddgorddu may turn out another Bronfloyd. When the truth is spoken there is nothing to fear, and nothing else will bear investigation.—*Aberystwith.* ANOTHER OBSERVER.

MINING IN ANGLESEY—THE PARYS MINE.

SIR,—Many persons will be glad to hear that the present company, who are working these old and far-famed copper mines, are progressing steadily in opening up entirely new working ground, by which a large number of the working class (added to the number of men, women, and children now employed) will find well-paid employment. The mines at present are wrought by a spirited London company, under the secretaryship of Mr. F. R. Wilson, of St. Helen's-place, Bishopsgate, London, and the able management of Captain Thomas Mitchell, a Cornish mine agent of high standing, not only in England, but also in Chili and California. On Tuesday last, it being the usual monthly sampling, the following lots were sampled by Capt. C. B. Dyer (on behalf of several of the copper smelters), and Mr. James M. Williams (assay master for the Mona Mine Smelting Company), for the coming ticketing:—Ores, 290; precipitate, 55: total, 345 tons.

At the dinner (Captain Mitchell in the chair), the following toasts were proposed:—"Success to Parys Mines, and a better price for copper." Everyone who knows these mines feels confident that only a reasonable price for copper is wanted to again enable them to pay heavy dividends. The mines are held on lease from the most noble the Marquis of Anglesey, and the Hon. Miss Hughes, of Llysdulas. Having heard that Miss Hughes was to be married that day, Sept. 26, Captain Dyer (under whose late management the Parys Mine paid a profit of 240,000*l.*) said he could not let the occasion pass without proposing a toast he knew all in the room would most heartily respond to, "One of the owners of the soil—the Hon. Miss Gwen Hughes, or, rather, he should now say Lady Neave, coupling her husband's name, Sir Arondal Neave, Bart." Miss Hughes and her mother, the late Right Hon. Lady Dinorbin, were much beloved in the immediate neighbourhood for their numerous charities to the poor, and it is to be hoped that Sir Arondal and Lady Neave will not spend the whole of their time from Anglesey, but show their happy faces amongst us as much as they possibly can. After spending a very pleasant afternoon the company separated, much pleased. MINER.

Amlwch, Anglesey, Sept. 27.

GREAT NORTH LAXEY.

SIR,—I wish to call the attention of the shareholders of the Great North Laxey Mining Company, through the Journal, to the unsatisfactory working of this mine. In 1869 a resolution was passed to increase the capital of the company, by new shares, 2500*l.*, for the purpose of proving the mine in depth. That money was spent, but to what extent in deepening I will presently show. In 1870 it was proposed to raise 7500*l.* for the same purpose. I find by the report of the directors that in 1868-69 there was spent in sinking shafts and winzes, 593*l.* 10s. 6d.; in driving levels and cross-cuts, 531*l.* 4s. 4d.; and in stoping, 542*l.* 3s. 4d. In 1869-70, driving levels and cross-cuts, 741*l.* 10s. 8d.; sinking sumps and winzes, 203*l.* 8s. 8d.; sinking north shaft, 151*l.* 10s.; and stoping, 744*l.* 4s. 6d. In 1870-71, I find—stoping 1174*l.* 2s.; sinking north shaft, 188*l.* 18s. 8d.; sinking sumps in the 84 north, 94*l.* 19s.; and driving levels, 499*l.* 12s. 4d. This shows how the money has been appropriated that was *professedly* raised to prove the mine in depth.

I have no doubt if the original capital had been properly used the mine would have been brought into a paying state without raising additional capital—those working the mine know that the Great Laxey did not pay till they got to or below the 110; and, being in the same kind of strata, they must know that it was depth that was wanted to make the Great North Laxey a paying mine.

Sept. 25. AN OLD SHAREHOLDER.

TERRAS MINE, AND ITS PROSPECTS.

SIR,—Having been misinformed as to the real circumstances of this mine, and having, in consequence thereof, in a letter in last week's Journal, expressed a doubt as to the paying character of the elvan now being wrought, I wish to correct my error. I was told that the company were working on the elvan at a loss. I am much pleased to find that such is not the case. They have gained already 600*l.* by that working, and by December next a further sum of 600*l.* is likely to be profited—so that a dividend out of such profits will be declared, as promised, next month. Enemies have been writing down the mine, but the returns of tin and the profit on the working will soon put to silence all malevolent opposition. It must be understood that the machinery of all sorts, erected and being erected, on the mine is to be paid for, or has been paid for, out of the subscribed capital, and that the profit is on the working. Those correspondents, "Argus," &c., who have been writing antagonistically have included the cost of machinery, engine-house, &c., in their statements of monthly cost. From what I saw at the mine I may state that a profit can be made, probably for generations to come, out of elvan alone; but the lodes are likely to add very considerably to the returns and profits. The last sale was about 1½ ton of tin beyond the previous sale, which shows the improving condition of their affairs, without any additional stamping-power; but additional stamps are to be added, to enhance the returns. Few mines so recently commenced can show such favourable results and such cheering prospects. The pumping-engine will, I find, be ready to start in a fortnight. Then Edwards's lode, which is reported as being very kindly, can be wrought, and other lodes besides. The intelligent agent is most active in his duties, pushing on all the works with expedition.

East Terras, at the east of Terras, is also a good mine, and well deserving a spirited working. I have heard that Captain Pope, the late manager of Wheal Basset, has inspected and reported on it.

I heard, too, that Fortescue Consols is about to be worked with energy. This is a good mine, and the adjacent mines of Wheal Marshall, Godolphin, and Wheal Grenville present very fair prospects. The last three are at present in the hands of Mr. Richard Hosken, of Penryn, and Capt. J. H. James, of Hay House, St. Stephen's, who are disposed to admit partners to work for profit. St. Stephen's mining district will soon flourish, judging from present facts and symptons.—*Truro, Sept.* 26. R. SYMONS.

THE TERRAS TIN MINE.

SIR,—This mine has been prominently before the public for nearly a year, and whilst some have praised it beyond measure, others have looked upon it as scarcely possessing a gleam of hope; but, to use a popular phrase, "it will not do to believe all one hears on either side." I have always considered it, simply from the reports of so many scientific men, as a mine of great promise, and this, I may presume to say, is now beyond a doubt. The tin is there in great abundance. I attended the meeting in London recently, and a more respectable class of men, from the managing director downwards, connected with the mine one would not wish to meet with. I have the utmost confidence in them. I also went down to Cornwall, and looked about the dressing-floors, and went underground; and Capt. Rickard was most attentive in telling me everything I asked him, and I consider him the right man in the right place. There is no puffing nonsense about him, but common sense and judgment in abundance. He told me how the mine was quadrupled in value within the last six months, or since they began to work on the elvan. Having never been at a tin mine before, I cannot pretend to be a judge as to how the mine is worked; but I saw more than I expected, and everyone busy, and matters going on in a business way. I am quite satisfied that Terras will be a first-rate tin mine, and that those who hold longest will be best rewarded. I have induced a good many of my Scotch friends to go into it, and I am glad they have done so, as I believe that ere a year is over shares that are now quoted at from 45s. to 60s. will very likely be sold freely at 200s.—*Ormiston, Tranent, N.B., Sept.* 26. JOHN ADDISON.

THE TERRAS DISTRICT.

SIR,—The thanks of all interested in mining are due to Messrs. Marlborough, who in last week's Journal commented on the fact that the Terras reports never put a value on their lodes, but use such vague terms as "rich for tin," "good work for tin," &c. But I wish to point out that all the mines in what I may call the Bodmin district have done this very thing for years past, and though these very mines in their prospectuses have compared themselves to the fine old mines of West Cornwall—Dolcoath, Tincroft, &c.—yet they rarely, or never, imitate them in putting an exact value per fathom on their lodes. Till this is done very little confidence will be placed in the above district by the investing public. The real state of the case I believe to be this:—There is plenty of tin in their lodes and elvans, but so sparsely disseminated that a profit can be made only by treating immense quantities, and with a very high price for tin. Another evil in the above mine is, that when they give the number of tons of ore sold they never state the time taken to raise it. AN OLD ADVENTURER.

TIN MINING IN CORNWALL.

SIR,—I am pleased to find that a work under the above, or an analogous, title is about to be published by a gentleman who has already contributed largely to the information of mining men by several volumes, under the name of "Statistics of Mines in Cornwall and Devon," published for several successive years. I refer to Mr. Spargo, of Gresham House, London, whose extensive connection with, and intimate knowledge of, mines in general, but of those in the two western counties in particular, have qualified him for such a work. Having been engaged during the last 18 years in the business of mine-broker, manager, and promoter of mines, he must have acquired an amount of knowledge which any other person not similarly connected could not acquire. I have no doubt that the adventurers in mines will be much pleased to see an account of the rise and progress of our tin mines, which have become of late the most important for mineral production. There was a time when copper mines were uppermost in the estimation of investors, and when tin mines were slightly regarded; but now the "tables are turned," copper mines being comparatively little sought after, and, what is very remarkable, nearly all our copper mines have become tin mines. In some of the once rich copper mines tin was left unwrought, as undeserving of attention—Harmony and Montague to wit. In those (United) mines in Redruth abundance of tin is said to have been discovered by the present company. The agents say that the tinstone discovered will last for generations. The company are now erecting a powerful steam-stamps for reducing the stone for the extraction of the metal, and it is said that the company may look for early dividends after the stamping and dressing apparatus are in working order.—*Redruth, Sept.* 26. MINER.

FRANCO CONSOLS.

SIR,—Will the captain of Franco Consols favour us with the nature of the great discovery of copper, the value of the lode per fathom, whether it is in the bottom level in whole ground or otherwise, and whether the mine is the old Wheal Franco fresh christened? Simultaneously with the announcement of the fresh discovery, I perceive an offer for shares at 25s. each. I have searched the List of British Mines in the *Mining Journal*, but cannot find Franco Consols. Perhaps the captain will state also into how many shares the mine is divided, and whether it is distant six or seven miles from the Devon Great Consols?

Sept. 27. DEVONIENSIS.

SILVER MINING IN NEVADA AND OTHER PACIFIC STATES'

TO THE EDITOR OF THE TIMES.

Sir,—I notice that Mr. H. H. Roche questions whether any such passage exists in the report of Mr. R. W. Raymond as that which I quoted in the *Times* some days since. As there are many copies of Mr. Raymond's report in the hands of American gentlemen connected with Pacific mining in the City of London, the question need not have remained one of opinion, as I gave the page of the volume. In order, however, that there may be no mistake, I now leave the report itself in your hands, in order that you may corroborate the extract. I think I may say, without irrelevancy, that the contradiction in question is typical of the rash nature of the assertions in which promoters of American mines are apt to indulge.

In reference to the letter of Mr. Wigfall, I may remark that the statements I made with regard to mining in Nevada (*pace* Mr. Roche) were simply reproduced from the authoritative reports of officers of the United States Government, the object of whose mission was to place mining in Nevada in as favourable a light as was consistent with the truth. I do not notice that Mr. Wigfall challenges the correctness of these statements, although he may well be amazed at them. In fact, they cannot be challenged; for as to the Comstock lode, which may be said to constitute the Washoe district, the whole of the figures, although apparently not available to Mr. Wigfall, have been published over and over again, and are embodied in several official State and United States documents. There remain the Reese River districts, of which Austin City is the head-quarters, and the White Pine district, with head-quarters at Treasure City.

With regard to the Reese River districts, they were discovered in the spring of 1862, and since then have been worked spasmodically, notoriously at a heavy loss on the whole. Of course, in speaking of these Reese River districts, as of all others, I do not for a moment question that small local companies—principally of working men, although now and then in partnership with neighbouring storekeepers—have done very well. I speak of companies organised on a large scale at a distance, whether that distance be as far as San Francisco, Chicago, New York, Boston, Philadelphia, or London; and of these I speak with knowledge, for I possess a very full statistical account of the result of the Pacific Coast mining companies brought out in London and San Francisco since 1849, and an approximately complete one of the companies floated in the cities of what a Californian would call the "States."

As to the White Pine district, which occurs in the limestone formation, and consequently partakes of the characteristics of all metallic deposits in that formation, it was not discovered until the fall of 1868; and the 'White Pine fever,' as it was called in San Francisco, commenced about the close of that year, reaching its height in the early part of 1869. As an evidence of the extraordinary amount of attention which this district then received in San Francisco, I enclose you a list of 160 mining companies (with the date of incorporation and the capital of each attached) incorporated in that city to work mines in the White Pine district during the quarter extending from the middle of December to the middle of March. These companies possessed a nominal capital of $246,884,000 in gold—say, nearly 50,000,000*l.* sterling. The same railway facilities which are now possessed were then in existence, yet I believe (it is difficult to speak with absolute certainty respecting such a large number of companies) not one of these companies has flourished; indeed, towards the fall of 1869 the district was involved in dire distress. It might be interesting to your readers if some of the American gentlemen who at present so ably represent this district in London would state how many of the mines already sold, or on sale, in this market were included in this list.

The considerations which induce Mr. Wigfall to take a hopeful view of the future of mining in the Pacific States lying east of the Sierra are shared by many shoals of articles, and, indeed, bulky volumes, having been written to endeavour to explain away the facts of the past, and to prophesy rosy times for the future. As is customary with mines everywhere, scapegoats were sought in any direction. When I first knew California it was upon the shoulders of British stock jobbers and British mine captains and superintendents that the blame was cast. Recently we have been in high favour—suspiciously high, I fear—and the whole blame is thrown back on San Francisan "rings"—bad enough, no doubt, but like many others, scarcely so bad as it is now convenient to paint them.

No doubt in its early days the Comstock lode was expensive to work, but not so very much more expensive—if indeed at all more so—than has been the case with some of the eastern districts of the State. But as against this extra expense (assuming it) the early worker on that great lode had deposits of silver hitherto without parallel in the world for regularity and extent, and which in the ordinary chances of things are not likely to be again immediately paralleled, and with which the uncertain irregular deposits in the eastern districts cannot be reasonably compared. On one point, besides, Mr. Wigfall is misinformed. There are certainly some very small claims on the Comstock ledge (although some of them have been by far the most profitable), such as the Plato, which is only 10 ft.; but the leading mines on the ledge, such as Yellow Jacket, with 957 ft.; Chollar Potosi, with 1434 ft.; Savage, with 800 ft.; Gould and Curry, with 1200 ft.; and Ophir, with 1200 ft., will be found far more extensive than the generality of those in the newer districts, except in extreme outlying parts.

The real difficulties to be encountered in Nevada, and which have hitherto made mining there unprofitable, are not very easily disposed of. Indeed, they are not at all understood in England, and have only been recently comprehended in the Eastern States of the Union. I may say that they are not mere questions of expense, which no doubt would, in time, be to a great extent overcome.

F. G. S.

THE ECLIPSE MINING COMPANY.

SIR,—Will you kindly permit me to make a few observations with reference to this company, which was formed somewhere about the latter end of March, 1869, under very favourable auspices, being pronounced a first-rate gold mine of (as it subsequently turned out to be), some 11,000 feet in length. I have no desire to call in question the conduct of a highly respectable board of directors, whose management of the concern may hitherto have been highly judicious and proper, but who, not being exactly aware of difficulties and hindrances constantly occurring in the mountainous districts of the Sierra Gorila range, may lend too ready an ear to the suggestions of officials, either too sanguine, or who may have treated the appearance of things as too mature for instant operations.

I have before me the reports of Mr. Barratt and Mr. Tregellas, and judging from what they have written home (from between July 23, 1870, and July 6, 1871, the date of the last report), I should say that riches in abundance had been discovered, both gold and silver, to verify the panegyrics pronounced upon the Eclipse Gold Mine, and to cause the shares to rise far above the small discount they now command. But alas! notwithstanding the flourish of trumpets with which it was announced that the requisite machinery had been sent out to California—that samples of quartz bearing gold and silver had been received, and assays also—we know not either the quantities obtained nor the richness thereof, and are in possession of no further facts of interest to the proprietors, save that the Ida stamping mill had been purchased for 400*l.*, had been tried, had crushed some 120 tons of quartz in two months, worth nobody knows what, and was a failure. I suppose this last fact is nothing new, but I must take the liberty of saying that to purchase an old worn-out mill, which our friends the Yankees had cast off, was at least a cute trick so far as they are concerned, but a sad disappointment to the shareholders, whose hopes of speedily receiving a dividend are thus put off, not, let us hope *sine die*, but certainly until the new mill has come into profitable operation, and the hundreds of tons of metal and ore in dump have been brought, stamped, and remitted in the shape of ingots of gold or silver. But hope is expressed by Mr. Tregellas that by the time his report (dated July 6 last) reaches head-quarters he will be crushing quartz, and that matters will then be different. Let us hope for the best, but judging from the date of this letter (Sept. 27), there is still some screw loose, else why do we not receive further information from California, for there have been mails from the Pacific, as well as constant arrivals from New York, if the mails come that route?

In conclusion, let me remind the executive that in his report of Feb. 7, 1871, Mr. Tregellas hints that such is the quantity of metal discovered (especially in silver) as probably to stop further calls and leave a good profit, but that he was progressing slowly with the mill. And in the report for March he says—"Progress at mill small, waiting for materials, manager finds as much to be done as if nothing had been accomplished." Surely, Mr. Editor, I need say no more. There must be grievous fault existing somewhere, which should be enquired into, or else the board should not be surprised if further mention be made in more official quarters, when enquiry can no longer be put off. A SHAREHOLDER.

September 27.

[For remainder of Original Correspondence see to-day's Journal.]

"TAILINGS" TWO THOUSAND YEARS HENCE.—The immense piles of tailings which are being accumulated in various portions of the mining regions in this State and Nevada are suggestive to the thoughtful mind of something similar to the following, which we find in a late number of the *Australasian*:—

"In the year 4000, or thereabouts, when the Anglo-Australian race shall have been "played out" on this continent, and our posterity shall have degenerated as the Greeks have done, will the New Zealander of the period, accomplished in arts which are unknown to us, and armed with scientific appliances, such as we have never dreamed of, come over to Victoria and extract tons of gold from the tailings in our desolate and deserted gold field! The question is suggested by what is actually taking place in Attica. About 300 years before the Christian era the silver mines of Laurium were exhausted and abandoned; but seven years ago a Franco-Italian company obtained a concession to treat the scoria and other refuse for silver, and their operations have been conducted on so large a scale that a town containg 4000 inhabitants has sprung up on what was formerly a solitude; a railway has been constructed to the nearest port, and a small steam-vessel plies twice a week between Argosteria and the Piræus for the transport of the argentiferous tailings to the roasting furnaces."

MINING HOISTING WORKS.—I will give you the particulars of the workings of the double cages at the Yellow Jacket Mine, which may be interesting to the mining public. They have been in constant use now for over three months. The upper cage is 7 ft. high, and, with eccentric safety, weighs 1300 lbs., the lower one being 6 ft. high, and weighs 450 lbs. The foreman and miners say that the cages run much steadier than when single ones were used. Now, as to economy. With the single cage they averaged, from the 1100 ft. level and return, a trip every four minutes, or 15 trips an hour, each draft bringing 1500 lbs. of ore or waste, allowing half-a-minute (which it does not require), on the 1100 ft. level and the surface, for changing additional car—we will say five minutes for each trip; same as made before in four minutes, or 12 trips an hour. Each draft bringing 2800 lbs. to the surface, showing an increase of work done by one rope as follows:—By single cage, 10½ tons per hour, and by new ones 16 tons, or an increase of about 120 tons in 20 hours, or 240 tons increase of hoisting capacity with the two double cages. Formerly they started from the bottom of the shaft with 6000 lbs. of rope and 1300 of cage to raise 1400 lbs. of ore. Now, with an additional weight of 450 lbs. of lower cage, they raise 2800 weight of ore, which, as can easily be seen, is a great saving. Another economy is that, as the cages make many trips with only a man or two, now, if timber is to go down, or any men to come up, an empty or a loaded car, as the case may be, is always on the lower cage. The double cages carry from 18 to 20 men at a trip, whereas the single ones carried only 9 or 10. The Yellow Jacket Company are about to hoist ore for the Belcher Mine, and it would be supposed that it could not be done without a sacrifice of their own work. The foreman, Mr. Donnelly, assures me that they can hoist for the Belcher 200 or 300 tons per day, if required, without delaying their own work. With single cages this could not be done. Since the introduction of double ones the consumption of wood has been reduced over three cords per day. One of the double cages was run, to ascertain its capacity, as fast as possible, and in 80 minutes 68 loads of 1400 lbs. each were raised from the 1000 ft. level—that is, 34 trips of 2800 lbs. at each draft; in all, over 47 tons in 80 minutes. Chairs are used on the levels for changing the upper and lower cars, the same as are used on the surface at the mouth of the shaft. By an ingenious application the lower cage passes through and allows the upper one to be changed first. The steel wire-ropes used are ½ in. by 5 in.—DEEP MINER.—*Scientific Press* (California).

A NEW STEAM-BOILER.—This improvement is based upon the idea that uninterrupted circulation of the whole body of water in a boiler is a barrier to obtaining the best results in producing steam in such boiler. The introduction of diaphragms or partitions or their equivalents, which shall form separate water compartments in steam-boilers, such compartments being so arranged that the heated gases and products of combustion, in their course from the fire-box through tubes or in contact with surfaces to the "up take," shall come in contact with surfaces of a gradually decreasing temperature, the variations in temperature of such surfaces being caused by the division of the body of water within the boiler by means of the diaphragms or partitions, or their equivalents, constitutes the general character of the invention. The inventor states in his specification that, in adopting this principle, he is aware that he his running in direct opposition to the generally received theory, as the effort has heretofore been to produce just what he endeavours to prevent, a general circulation of the whole body of water from which the steam is generated. In locomotive boilers he employs three series of tubes, through which the heated gases pass in their course to the up take, by diaphragms or partitions. These series of tubes are separated. The diaphragms obstruct, if they do not entirely prevent, the circulation of the water, and the products of combustion will, in their course to the smoke-box, pass over surfaces or through tubes of gradually diminishing temperatnre. The sediment naturally settles in a lower compartment from whence it may be readily removed by having a large man-hole or two hand holes in the bottom of the shell. The water which fills the water-legs of the boiler will consequently be nearly or quite pure. A flue, connected with the fire-box, is made to divert a portion of the heat before it enters the flues of the water space, and conduct it through the steam-drum. By this means the steam is thoroughly dried and superheated before it is taken out of the drum for use. A valve regulates the quantity of heat which enters the superheating flue. This valve is operated by the expansion and contraction of a rod (or upon the Thermostadt principle), in the steam-drum. A valve connected with this rod also regulates the draft through the upper series of flues. The heated gases and products of combustion which are allowed to pass through the steam-drum are returned, and made to pass through the second series of fire tubes. A valve

damper, by the opening of which a direct draft from the fire-box to the stack is obtained, is also used. In starting fire in the fire-box this arrangement is of much importance. Orifices through the diaphragms allow the feed water to pass upward from the lower to the upper series of tubes, and return chambers are placed intermediate between the series of tubes. The inventor of this steam-generator, Mr. Nathaniel M. Blanchard, of Spuyten Duyvil, New York, has thus boldly struck out a new path.—*Scientific American* (U.S.)

THE SUBTERRANEAN WORLD.

Whenever instruction can be conveyed to the reader through the medium of an interesting narrative it is much more likely to be received and turned to profit than if it were given in the form of a dry and systematic task, and for this reason the works of Dr. George Hartwig are always received with favour by all who desire to learn something of the wonders of nature without troubling themselves to become masters of the sciences involved in the formal study of the subject. In his present volume* the attractive style of his former works is well maintained. In his sketch of geology he attributes the existence of the present geological formations to the combined action of water and subterranean heat, observing that had the levelling power of water never met with an antagonistic force there can be no doubt that the last remains of the dry land, supposing it could ever have risen above the ocean, must long since have been swept into the sea; but while water has been constantly tending to reduce the irregularities of the earth's surface to one dull level, the expansive force of subterranean heat has been no less unceasingly active in restoring the unevenness of the external crust by the ejection or protrusion of new masses of stone (porphyry, trachyte, basalt, lava, &c.), and by the consequent disturbance in a variety of ways of the stratified rocks. And he thinks that subterranean fire, and its assistant steam, have not only produced vast mechanical changes, but that they have also been the frequent causes of great chemical metamorphoses in the rocks subjected to their action. To the calcining, decomposing, and vapour-generating effects of heat he traces the origin of the marble of Carrara, of alabaster, of gypsum, and all those various species of stone which geologists include under the name of metamorphic rocks. He remarks, moreover, that a complete study of all the various transformations by fire or water which the surface of our earth has undergone would require an elaborate treatise of geology, and lies far beyond the scope or the pretensions of a popular volume, which is chiefly devoted to the description of caves or mines, but he cannot omit all mention of the fossils embedded in the various strata, of its internal heat, of the upheavals, and subsidences which have played so conspicuous a part in the history of the earth's rind, and are still proceeding at the present day, of the water percolating or flowing beneath the earth's crust, and finally of the volcanoes and earthquakes, which prove to him that the ancient subterranean fires, far from being extinct, are still as powerful as ever in remodelling the surface.

The chapter on fossils is a particularly interesting one, and conveys a large amount of valuable information. A few general remarks are succeeded by excellent notices of the eozoon canadense, trilobites, brachiopods, and subsequent remains. He very truly remarks that among plants the most frequent fossil remains are furnished by stems, roots, branches, fruit stones, leaves; and among animals by corals, shells, calcareous crusts, teeth, scales, and bones. But the few memorials that have thus survived the lapse of ages enable us to form some idea of the multitudes that have entirely perished; and the petrified shells of the ammonite, or the jointed arms of the encrinite, are proofs of the existence of the world of tiny beings which served them for nourishment, and have been utterly swept away. If we consider that the number of all the known species of fossil plants hardly amounts to 3000, while the flora of the present day, as far as it has been examined by systematic botanists, numbers at least 250,000 species; that the host of living insects is probably still more numerous, although not much more than 1500 extinct species of this class are known to us, and that finally the remains of all the extinct crustaceous fishes, reptiles, and warm-blooded animals are far outnumbered by the species actually living, we may form some idea of the vast multitudes that have left no trace behind, and whose total loss will forever confine within narrow limits our knowledge of the past phases of organic creation. In this chapter ammonites henleyi, pterygotus acuminatus, spirifer princeps, ptherichthys milleri (restored), ventriculites, siphonia costata, encrinis liliiformis, pentacrinus briareus, marsupites ornatus, belemnites (restored), glyptodon clavipedes, and other fossil remains are figured, and add much to the interest with which the descriptive matter is read.

Referring to subterranean upheavals and depressions, he remarks that the attention of geologists having once been directed to the partial upheaval of the Scandinavian peninsula similar facts were soon pointed out in other countries. At Bourgneuf, near La Rochelle, the remains of a ship wrecked on an oyster-bank, in 1752, now lie in a cultivated field 15 feet above the level of the sea, and within a period of twenty-five years the parish has gained at least 1500 acres. Port Bahaud, where formerly the Dutchmen used to take in cargoes of salt, is now 9000 feet from the sea, and the Island of Olonne is at present surrounded only by swamps and meadows. While many coasts thus show signs of progressive elevation, others afford no less striking proofs of subsidence, frequently in close proximity to regions of upheaval. Thus on the south-west coast of England, in Cornwall, Devon, and Somerset, submarine forests consisting of the species still flourishing in the neighbourhood are of such frequent occurrence that, according to Sir Henry de la Beche, "it is difficult not to find traces of them at the mouths of all the numerous valleys which open upon the sea." Sometimes they are covered with mud or sand, and generally the roots are found in the situation where they originally grew, while the trunks have been horizontally levelled. At Bann Bridge, specimens of ancient Roman pottery have been discovered 12 feet below the level of the sea, and the remains of an old Roman road, now submerged 6 feet deep, prove that the subsidence of land has been going on since the time of Julius Cæsar and Agricola. We now need not wonder at seeing sea-shells embedded in the highest mountains, or buried hundreds of fathoms under the ground, at alternating layers of marine and sweet-water deposits being frequently stored one above the other, or at originally horizontal strata being now found at every possible angle of inclination. Subterranean waters and artesian wells, and volcanoes are treated of in subsequent chapters, the author remarking that the cause of volcanoes must, in all probability, be sought for in the expansive force of steam, for when water penetrating through crevices or porous strata comes in contact with the heated subterranean mass, it is evident that the steam thus generated must press upon the lava, and when formed in sufficient quantity ultimately forces it up the duct of the volcano. In other cases he supposes a continuous column of lava mixed with liquid water, raised to a red-hot or white-hot temperature under the influence of pressure. He thinks that the important part which water plays in volcanic action is sufficiently proved by the enormous quantity of steam which is poured forth during every eruption, or is constantly escaping in the fumaroles of a crater.

Gas springs and mud volcanoes, earthquakes, the great earthquake at Lisbon, landslips, caves, and cave rivers are discussed in subsequent chapters, considerable interest being added to the latter by the insertion of a good description of the proteus anguinus. The Magdalena, or Black Grotto, he tells us, is situate about a league to the north of Adelsberg, and slants abruptly into the bowels of the mountain. After a long and difficult passage over blocks of stone or through soft mud, a tranquil pool is at length reached, which rises and falls simultaneously with the waters of the Poik, and proves by this reciprocal action that in all probability all the numerous grottoes and subterranean river channels of this so strangely undermined country form but one vast and intricate network. It was in this pool, which no light illumines, and no wind ever stirs, that numerous protei were first discovered, but as hundreds of specimens have since found their way to the cabinets of naturalists, to be observed, dissected, or bottled up in spirits, their number has very much decreased, and the time is perhaps not far distant when they will be entirely extirpated in the grotto, where from time immemorial they have enjoyed an undisturbed security. The proteus is one of those remarkable reptiles which breathe at the same time through lungs and gills, having on each side of the neck three rose-red branchæ, which it retains through life, as its lungs are but imperfectly developed. It has a long ell-like body, with an elongated head, a compressed tail, and four very short and thin legs. The skin is flesh-coloured, and so translucent that the liver and the heart, which beats about 50 times in a minute, can be distinctly seen underneath. In spite of its apparent weakness it is able to glide rapidly through the water. Its four little legs remain immovable while swimming, they are only used for creeping, and then in a very imperfect manner. During rapid movements the gills swell and assume a lively scarlet colour; when quiet they collapse and become white, like the rest of the body. Sometimes the animal raises its head above the water to breathe, but pulmonary respiration evidently plays but a secondary part in its economy, as it can only live but a very short time out of the water. The skeleton consists almost entirely of cartilage. The eyes, two little black spots, lie buried under the skin, and, as may well be imagined, are very imperfectly developed. Although more than a thousand specimens have been observed, yet but little is known about its mode of life, nor has it been ascertained whether it is oviparous, or brings forth live young. In a captive state the proteus is able to live for several years without any apparent food, but on fastening a small worm on the extremity of a thin stick, and holding it under the water close to the head of the reptile, it shoots rapidly towards it, swallows it with the same velocity, ejects it again, and repeats this manœuvre several times, until it finally retains the morsel. The untiring zeal of the German naturalists has discovered the proteus in 31 different caverns, and ascertained seven distinct species, varying by the size, the form of the head, and the colour of the skin. Two different species never inhabit the same cavern.

The best method for transporting the proteus is now perfectly understood, and living specimens have been conveyed as far as Russia, Hungary, and Scotland. All that they need is a frequent supply of fresh water, and a careful removal of all light. Their food need cause no trouble, as the water contains all they require. It is recommended to lay a piece of stalactite from their native grotto in the vase in which they are transported. When resting or sleeping they coil themselves round the stone, as if tenderly embracing it. In this manner they have already been kept above five years out of their caverns. The guides to the Grotto of Adelsberg have always got a supply on hand, and sell them for about 2 fls. each. Then follow chapters devoted to the consideration of caves as places of refuge; hermit caves, rock temples, and rock churches; ice caves and wind holes; rock tombs and catacombs; and of caves containing remains of extinct animals, &c., until, at the twenty-second chapter, we come to tunnels, including a brief account of the Mont Cenis and its construction, which prepares the way for the study of mines in general.

The whole volume is beautifully illustrated, whilst the descriptive matter gives evidence of a large amount of research having been brought to bear upon it. For a professedly popular treatise we know of no work from which an equal amount of practical knowledge could be acquired with equal pleasure, and in so short a time.

* "The Subterranean World." By Dr. GEORGE HARTWIG. London: Longmans, Green, and Co.

INTERNAL TEMPERATURE OF THE EARTH.

It had been arranged that from the commencement of the Alpine Tunnel observations of the temperature, at intervals of 1 kilometre (3281 ft.), should be taken at both ends during the progress of construction. Signor Borelli, the resident engineer at the Italian side, undertook and carried out these observations very perfectly on his part of the work; but, unfortunately, his colleague at the French end very soon lost interest in the matter, and such observations as were made were not recorded. Thus, the opportunity of comparison of two independent sets of observations, which would have been of very great value, has been lost, and this is the more to be regretted because the present data, in many respects, do not correspond with our previous knowledge of the rate of increase of heat as the distance increases from the earth's surface. The dimensions, &c., of the tunnel have been already before our readers; but, for better comprehension, we repeat them here. The total length of the enclosed boring is 40,140 ft., and the highest point of the mountain in a vertical line above it is 5280 ft.—this point being 21,156 ft. distant from the Italian end. The rocks through which the tunnel has been driven consist, for the most part, of calcareous schist, partly talcose, and containing many bands and strings of quartz. The whole of the Italian work consisted in piercing through rock of this kind, and the same rock was met with at a distance of 11,000 ft. from the French side. All the rocks traversed are metamorphic, being, however, stratified, dipping at an angle of 50° or thereabouts to the north-west, and corresponding in age to the secondary rocks of England, from the Oxford clay to the Rhœtic inclusive. The excavation of the tunnel from the Italian end was suspended when 6 kilometres (about 20,000 ft.), had been completed being rather less than half-way; but as the excavation from this end had been much more rapid than it had from the other, a small heading was continued to the distance of about 3000 ft. further, when the French work from the other side was met. On the opening being completed a rush of air took place, driving the smoke of the last blast rapidly before it and towards the Italian end. It may be assumed that the tunnel will act as a kind of chimney—that and ventilation will be much assisted by an upward current of air, when it is considered that its Italian end is 4241 ft. above the sea level, whilst the northern or French end is only 3806 ft.—being a difference of 435 ft. in favour of a natural ventilating current. The following statement is a translation by Prof. Ansted of that published by Signor Giordano, who has tabulated the observations of Signor Borelli:—

No. of observations.	Distance from S. entrance. Feet.	Temperature. Air. Fahr.	Rock or water. Fahr.		Depth in feet.
1	1312	50·9°	51·8°	Small spring.	
2	1640	50·9	57.6	Boring from a heading 24 ft. from the wall of the tunnel	1500
3	3281	59·5	62·6	Boring of 16 ft. from heading	
4	3675	59·5	62·6	Small spring	
5	6562	64·0	67·0	Boring of 10′ from heading, 21½′ from wall	1700
6	8202	64·0	68·0	Small spring	
7	9266	64·0	68·0	ditto	
8	9843	68·5	7·30	Boring similar to No. 5.	
9	13124	73·4	74·5	ditto	
10	16404	76·1	81·5	ditto	3000
11	19686	80·2	84·0	Boring of 10′ in a recess 13′ from wall, near the point where the excavation was suspended..	4500
12	21156	86·1	85·1	Boring of 7′ under the culminating point of mountain. Small heading 7′ from wall	5280
13	21858	86·2	82·4	Small spring.	
14	22967	77·0	80·6	Boring of 7′ into wall of small heading	4750
15	22993	77·0	77·9	Small spring.	

From this table it appears that the observed difference of temperature of the rock between the distance of 1640 ft. from the entrance and the distance of 21,156 ft. is 27·5° Fahr., the difference of depth beneath the surface in that distance being about 4600 ft. If we allow for the increase of temperature of the air due to the number of men employed and the frequent blasting, the difference may be more safely estimated at somewhat less. The true maximum temperature of the rock may be taken at 84° Fahr., and the part of the tunnel having this permanent temperature is 4250 ft. above the sea, the corresponding point of the surface vertically above it being 9530 ft. above the sea. The difference of the levels is, therefore, 5280 feet. Mr. Ansted believes that a careful estimate of the distribution of the mountain mass would show this to be somewhat in excess of the true difference, and that if the slope were perfectly even the difference of level would be about 5080 feet. The mean temperature of the air decreases in ascending to the higher parts of the atmosphere at the rate of 1° Fahr. for each 317 ft. of ascent, and the stratum of invariable temperature in descending into the earth is nearly 2° Fahr. warmer than the mean temperature of the air at the surface. The City of Turin is 820 ft. above the sea, and its mean temperature 54·5° Fahr. The difference in level between Turin and the highest point above the tunnel is 8710 ft.; this, divided by 317, gives 27·5° Fahr. as the amount to be deducted from 54·5°. Thus, the mean calculated annual temperature at the surface of the highest point above the tunnel would be 27·5°, and, adding 2° to this, the calculated temperature of the stratum of invariable temperature would be 29·5° Fahr. Estimated in this way, the difference of temperature between the mean temperature of the air on the assumed surface above the central point in the tunnel, and that point would be 84° — 27·5° = 56·5° Fahr., and the rate of increment (the difference of level being 5080 ft.) 1° in $\left(\frac{5080}{56·5}\right)$ = 90 ft. nearly; or, assuming the stratum of invariable temperature to be 80 ft. below the surface, 1° in $\left(\frac{5000}{54·5}\right)$ = 91 ft., thus showing a very considerable variation of result as compared with most other observations that have been made in Europe and elsewhere at various levels. Signor Borelli's observations, tabulated according to these calculations, yield the following figures:—

Observation.	Distance from S. entrance—Ft.	Depth from surface—Ft.	Temperature.	Rate of increment.
3	3,281	1700	62·6°	1° Fahr. in 43 ft.
5	6,562	1700	67·0	,, 50
8	9,843	1700	73·0	,, 61
9	13,124	1700	74·5	,, 63
10	16,405	3000	81·5	,, 65
11	19,686	4500	84·0	,, 84
12	21,156	5280	85·1	,, 91
14	22,967 / 18,245 from N. end	4750	80·6	,, 93·4

THE MONT CENIS TUNNEL.

In the sitting of the French Academy of Sciences on Sept. 18, M. Faye being in the chair, M. Elie de Beaumont, the perpetual secretary, read an elaborate paper for eliciting the scientific teachings which may be drawn from a close examination of the collection which is to be exhibited in the School of Mines at Paris. That collection, which was originally of 127 specimens, has received 69 new specimens, which brings the total number to 196 specimens altogether.

The old collection and the old specimens were presented to the Academy on July 4, 1870, being described under 127 numbers in the *comptes-rendus*, and exhibited in the School of Mines' Museum. The new numbers are placed in a continuous series with the others under the same numbers, and distinguished by *bis*, *ter*, &c. Each specimen is supplied with a label showing the distance of the place where it was collected from the opening of the tunnel. The Parisian collection can be compared with any other, as well as with the original collection, which is kept in Turin.

According to M. Elie de Beaumont's classifications all these 196 specimens can be ranged under six different headings, having respectively the following vertical thickness, which is found by a special calculation deriving it from horizontal length in the tunnel and inclination:—1, zone anthraciteuse, 1137 metres, 41; 2, zone des quartzites, 381 metres, 40; 3, zone calcareo gypseuses, 496 metres, 07; 4, zone calcaire schisteux sup., 1604 metres, 46; 5, zone calc. schisteux moylen, 1580 metres, 95; 6, zone cal. schisteux inf., 2023 metres, 49.

The end of the sixth zone was not found.

The differences between the three zones for calcaire schisteux are trifling, and their total thickness is more than 5000 metres.

The total vertical thickness explored was more than 7000 metres.

The general colour is grey, or rather black, and the colouring matter is mostly carbon. Two other elements are very common—first, talc; and secondly, sand hyaline, very small, very hard.

Very few fossils were met with, having been destroyed by a subsequent crystallisation.

It is necessary to acknowledge that, generally speaking, there is a single stratum of 7000 feet, which was perforated without exhibiting any very startling difference. It is a part of a single enormous formation, in spite of a few special differences.

The last commotions which have created Mont Cenis and made it emerge from the bottom of the sea have produced many cracks in relatively modern times. But all these faults were filled up with quartz in a perfect manner. The infiltrations amount to nothing practically. The only spring which was discovered is situated near Modane, and gives only 7 gallons per minute. The water is cold. Contractors were obliged to send to Modane and Bardonèche for the water required for drinking, and for grinding the stone. It is to be noted that working men were found to be practically better acquainted with the differences of the stone according to the stratum perforated actually than any theoretical mineralogist in existence.

Mont Blanc, although being 4800 metres above the level of the sea, is only 3500 above its own basis. So the vertical distance of perforated stratum is strictly equal to two Mont Blancs. It is something like one whole Himalaya. M. Sismonda presented to the Royal Academy of Sciences, Turin, in the sitting of Dec. 5, 1866, a paper entitled "*Nuove osservazioni geologiche sulle rocce anthracitifere delle Alpi*," at the end of which was printed a map drawn by M. Sismonda 25 years ago, and exhibiting the theoretical succession of strata. Everything was found in the place where it was supposed to be by M. Sismonda. Verification was absolute on an immense scale, so it is possible to say "That for the learned men the mountains are made of glass, as their eyes can see everything within their abysses."

No artesian well has ever given an opportunity to be compared with the perforation of Mont Cenis, as the deepest bored by European engineers is only 1000 metres, and by Chinese with their rope only 3000 metres. Very likely if a tunnel is ever to be perforated through crystalline mountains of truly granitic and volcanic formation, other results might be found.

The Academy listened during more than an hour to the lecturer. M. Faye presented to the learned perpetual secretary the hearty thanks of the company, and expressed a wish that experiments for oscillating pendulum should be conducted on the top of Mont Cenis, as well as in the central part of the tunnel.

M. Sismonda, whose name has been mentioned, is Professor of Geology at the Academy of Turin.

The specimens will be very shortly exhibited in the National School of Mines, as mentioned by M. Elie de Beaumont.

CONSTRUCTING STEAM-BOILER AND OTHER FURNACES.—In carrying out the improvements comprised in his recent invention, Mr. C. H. HOLT, of Manchester, prefers to cast to cast the fire-bars in groups of three or more together, and at each end of each of such groups there is formed a curved nipple or boss, to rest, with capability of rocking, in corresponding recesses formed for them in bars, at the sides or other parts of the furnace. At, by preference, about the centre of the underside of each group of bars there is a stud or projection, and these studs or projections from the several groups are received into corresponding parts formed for them in a bar passing underneath them with capability of motion, so as to cause the whole of the bars connected therewith to be simultaneously rocked in either direction, as desired. Motion is given to this bar, which effects the rocking of the fire-bars by a bell crank lever, one end of which is by pin-joint connected to such bar, whilst the other end of it is formed as a handle, by which the rocking of the bars in opposite directions is obtained for the riddling out of the small ashes and the breaking up of the clinkers.

MANUFACTURE OF IRON.—The improvements in the means and apparatus for the reduction of iron ores, and for preparing the same for reduction, invented by Mr. T. S. BLAIR, of Pittsburg, U.S., consist in reducing pulverised iron ores to the metallic state, and if desired, carburising the same by forcing, reducing, and carburising gases under pressure through a layer of the ore. For this purpose the pulverised ore is either introduced at one end of the inclined perforated floor of a long horizontal chamber, through the perforations of which the gases are forced; or the ore is introduced into a vessel similar to the "Bessemer converter," having a perforated bottom, through which the gases are forced; or the ore is passed down a series of superposed inclined and perforated plates inside a chamber, so as to pass from the one plate to the next below, while the reducing gas is forced in from below, and caused to pass in jets through the perforations of the plates, so as to act upon, and at the same time agitate, the stream of ore. The ore is reduced to the requisite state of pulverisation by passing it in succession through a series of pairs of crushing-rollers, set at different degrees of fineness, the ore being made to pass from the one set of rollers to the other over shoots having holes, through which the finer particles of ore fall. At the bottom of the machine the fine ore is separated from the coarse by the action of a blast of air.

NEW VALVE APPARATUS.—The object of the invention of Mr. ALFRED TYLOR, of Newgate-street, is to regulate the flow of water through closet, bib, sluice, or pump-valves, by means of a valve with a spindle closing the top, and also the aperture through a valve-seat, and having a piston at the bottom or top of the spindle to act as a cushion, in combination with the construction of the valve and its seat, so as to prevent tremor in closing with the stream. The water from below the piston is removed and returned again to the cylinder in which the piston works through a pipe or by a pump, or between the piston and cylinder, thus regulating the

fall of the valve and limiting the time the valve is open. By applying a second piston below or outside the first piston the valve is made to fall by gravity and by the force of the water against the valve, or by means of a pump the valve is lifted off and lowered down to its seat independent of gravity, and of the pressure from the water-main against the valve. The valve is actuated by water, or by a screw or spindle, and lever or handle, as required, to open and close it for different purposes. The piston is made either above or below the valve, and either tight or loose in its cylinder, in accordance with other arrangements.

Meetings of Public Companies.

PEAK DOWNS COPPER MINING COMPANY (N.S.W.)

At the half-yearly meeting of shareholders, held at Sydney on July 31, the directors had to congratulate the shareholders on the successful operations of the company during the past half-year. A larger production at a reduced cost, coupled with an increased value of copper in England, has enabled them to obtain the favourable results anticipated a year ago. The plant and machinery are in efficient order. The alterations to the old furnaces and the erection of the new ones are all but completed and paid for: 1120 tons of copper have been produced. The quality of the ore raised has been of the usual average of 2 per cent., and the mining captain continues to report favourably on the state of the mine. At his recommendation, the directors contemplate sinking immediately new shafts on a portion of the property adjoining the present workings, so as to allow of the opening and draining of new ground by the time the ores now being used are worked out. Capt. Dennis reports that the richest ores seem dipping towards the point suggested for these new shafts. The expense of their construction, so as to cut the lode in the 60 fm. level, is estimated, inclusive of new engine and necessary machinery, at 7000*l*. In consequence of delays in the removal of copper from the mine during the early part of the year, the debt of the company has not been reduced to the extent to which it would have been had the carrying contract been more regularly performed. A large quantity of copper has, however, lately come to hand, and there is every reason to expect that as all present liabilities will be paid within a short time, the balance at credit of profit and loss account may soon be realised and available for distribution. Although sales of Peak Downs copper have been made at 73*l*. and 74*l*. per ton, it has been considered desirable not to exceed 72*l*. as the basis in estimating the value of copper and of ore in suspense account.

The statement of accounts shows at credit of profit and loss account on June 30 a balance of 49,703*l*. 13s. 4d., which the directors propose to appropriate thus—

In writing off the book value of the mine				£14,287	0 11
In paying—					
1. To the preferential shareholders interest for the half-year at the rate of 8 per cent. per annum on 33,334*l*.	£1333	7	2		
2. To the non-preferential shareholders interest for the half-year at the same rate on 66,666*l*.	2666	12	10		
3. To all shareholders equally a bonus in increase of dividend of 1 per cent. for the half-year	1000	0	0=	5,000	0 0
4. A further bonus of 10 per cent. for the half year				10,000	0 0
Being equal altogether to a dividend of 30 per cent. per annum, and leaving a balance at the credit of profit and loss account of				20,416	12 5
Total				£49,703	13 4

The directors had intended to recommend a payment in the shape of return of capital, but this they are advised cannot be done under the Deed of Settlement as it at present stands. They have, therefore, proposed in lieu thereof the increased bonus above mentioned.

Estimated value of copper made and of ore raised, on hand June 30, 1871—

Net proceeds to receive from shipments not yet accounted for:			
1306 tons refined copper, shipped to England under advance of 65*l*. per ton, valued in London at 72*l*., will leave at credit of the company a balance of 2*l*. per ton	£ 2,612	0	0
37 tons shipped without advance at 67*l*.	2,479	0	0
654 tons at the mine and on the road, at 52*l*. 15s.	34,498	10	0
Ore at grass:			
8380 tons of 20 per cent. ore, equal when smelted to 1676 tons copper (less 20 per cent. for contingencies, 335 tons).			
Leaving 1341 tons refined copper, at 30*l*. 9s. 2d., or 4*l*. 17s. 5¾d. per ton of ore at grass	40,844	12	6
Total	£80,434	2	6

ASSHETON MINING COMPANY.

A general meeting of shareholders was held on the mine on Sept. 19, Mr. WILLIAM NEWLAND RUDGE in the chair.

Mr. WILSON (the secretary) read the notice convening the meeting, and the minutes of the last were confirmed.

The report of the agents was read, as follows :—

Sept. 13.—In presenting you our report for the general meeting to be held on the 20th instant, we beg to say that very satisfactory progress has been made in opening out the mine.—North and South Lode: Lindow's Shaft: We have communicated the 10 fm. level to No. 1 winze sunk below adit; this has caused good ventilation, and opened out on the course of the lode north 16 fathoms; for the whole distance it is over 6 feet wide, producing in places fine stones of lead ore; this end is now within 8 fathoms of No. 2 winze, which is sunk below adit 6¼ fathoms on the hanging or soft part of the lode, and suspended in consequence of the water. This end (10) is now driving on the footwall, and will quickly get under the ore ground driven over in the adit, which we are looking forward to with intense interest. Gundry's shaft has reached the 20 fm. level below adit, and cross-cut driven east 3¼ fathoms, where it intersected the lode and opened out on its course south 3 fathoms; in this level we have only carried a portion of the lode 2½ feet wide, composed of a beautiful clay-slate, mixed up with stones of lead; in the extreme forebreast we are engaged cutting through the lode, and hope to reach the hanging wall before the meeting. About 15 fms. ahead of this end south we cleared up a sink below the 8 fm. level, which was sunk by the former workers about 2 fms.; here the lode is worth about 20 cwts. lead ore per fathom; no doubt this was suspended by them in consequence of the water. Seeing such a kindly lode in the 20 we think we shall soon get an improvement at this point.—East and West Lode: Mawr shaft has been cleared and secured since the meeting from within 2 fathoms of the 8 to the 20 fm. level, and this level also cleared and secured about 60 fathoms; here we found the lode beyond our expectations, but in consequence of the foul air we had great difficulty to work before we put in air machines—at the present time we have pretty good ventilation. Mawr shaft is down close upon 2 fathoms below the 20, in which the lode is worth 20 cwts. lead ore per fathom; we may remark this is the deepest point, and looks healthy for the bottom of the mine. Three stopes working in the roof of this level west, where the lode is worth 8, 12, and 20 cwts. lead ore per fathom respectively; there is still standing to the south of No. 3 stope what we call the south part of the lode, which is worth 2 tons lead ore per fathom; water is oozing so strongly from this part that it has compelled us to drive a cross-cut several fathoms further east in order to drain it, after which it can be worked to a greater advantage. This level (20) west is within 8 fms. to get under Browne's shaft, and lode worth from 15 to 20 cwts. lead ore per fathom. Browne's shaft is now down about 20 fathoms below surface, and we are pushing on the sinking of the same by a full pare of men on the copper part of the lode for dispatch, with the lead course still standing north; from this latter part we have broken fine specimens of lead; seeing this with the 20 west coming under, it is very probable a good lode will be met with even before a communication be effected. In the 20, east of Mawr shaft, we have reached the north and south lode, and opened out on its course south 2 fathoms; the lode is about 2 feet wide, worth 10 cwts. lead ore per fathom: here we shall have about 8 fathoms more to drive to reach the east and west lode the other side of the heave; at this point below the adit there has been a pretty deal of working by the former party; this we shall soon test. As soon as this end is a little further advanced we shall place a pare of men to drive north, and as far as can be seen nothing of any consequence has been done to the extent of our boundary and to surface; having such a long piece of unexplored ground it may be considered a mine of itself. At surface we have attached a line of flat-rods from the main line from Margett's engine to Gundry's shaft, which is working well; this has effected a great saving in the consumption of coal and other materials. Gundry's engine will now be solely occupied in drawing stuff from Mawr and Gundry's shafts to the former; we are laying down pulley stands, which we hope to get in readiness to work by the end of the week. We shall get another parcel of lead ore ready for market as quickly as possible. You will perceive by the foregoing remarks that the mine is now placed in a good working position, and looking at the ore ground in the way of opening out rapidly at Mawr shaft, and what we have a right to expect at Gundry's and Lindow's; we do not hesitate to say the shareholders are in possession of a very valuable property.—WILLIAM JOHNS, WILLIAM TIPTON.

The CHAIRMAN moved that the report and half-yearly accounts be received and adopted. He hoped that the shareholders, after hearing the report of Capt. Johns, and especially those who had been underground, would be convinced that the position and prospects of the mine fully justified them in subscribing for the residue of the debentures (about 2500*l*.) authorised to be raised at the last meeting. The opinion of the directors as to the future of the mine could best be judged by the fact that of the 2100*l*. debentures already subscribed for, three-fourths of the amount had been taken by the board. He would not further detain the meeting, except to congratulate the shareholders upon the fact that the mine was gradually improving, and the prospects were such as to warrant the expectation that Assheton would yet prove itself equal to all that had been anticipated of it. (Hear, hear.)—Mr. T. G. TAYLOR seconded the proposition.

Mr. WILLIAM GUNDRY (a director) said that knowing the extreme caution of the manager, he (Mr. Gundry) would venture to enlarge a little upon the report, having just been through the mine. Shaft Mawr, sinking under the 20, and the deepest point in the mine, can be seen a very valuable lode, and improving in worth every foot that is sunk. The 20, on the east and west lode, driven by the old men some 70 fms., is standing nearly all whole to the 8 fm. level above, and a large amount of profitable ground is here to come away at a good profit. West of Browne's shaft there is 300 fms. of virgin ground, and close to the boundary a mine is being worked privately by one gentleman. A finer lode than he has cannot be seen; in fact, this piece of ground alone is worth 20,000*l*. His brother and himself held about 1700 shares; with this interest they expect to make a large fortune ultimately. Levels are driving and shafts sinking on the north and south lode, and valuable ground is being laid open. It was only a question of time, in his opinion, to make Assheton one of the best mines in all Wales. Nearly a mile of levels have been opened on this lode, and although the backs have been worked away by the ancients in many places, all the bottoms are standing. One thing more he would remark, and a good deal for the manager to state—that is, he believes in Assheton there is a mine for a generation.

Mr. RICHARD DAMES said from what he had that day seen and heard he was quite prepared to take his proportion of the unissued debentures, and he did not hesitate to say that those shareholders who did not follow his example, and come forward and assist the board, would be acting unjustly to themselves and ungratefully to their board, who had so commendably subscribed their own capital to achieve that success which there seemed no reason to doubt would be attended by further development. It was unreasonable to suppose that gentlemen occupying the position of the directors were not only to give their time and attention to the administration of the company's affairs, but also subscribe their own capital, while the shareholders stood aloof, although ready enough to participate in any remunerative result that might be realised. (Hear, hear.) He believed that if his co-shareholders had availed themselves of the present opportunity of visiting the mine and gain all necessary information, as he had done, it would be found, if only in common fairness, to their own interest to no longer hesitate in subscribing their proportion of the requisite capital. Where it a cost-book mine, in which a general meeting would make a call for the amount necessary to carry on the operations, every shareholder would not only gladly responded, but consider it his duty to do so; and surely because it was a limited liability company, with its ordinary capital expended in the development of a property which had opened out so satisfactorily as to justify those whose opinions were entitled to respect to further subscribe, should not be regarded as a discouraging feature. If the capital thus expended had led to cheerless prospects, and proved the mine to be unworthy of further trial, the whole aspect of affairs would have been of a different character; but here, so far as he could judge, and he based his opinion upon the practical testimony of such men as Captain Johns, the manager, they possessed a property with the inherent elements of a grand future, but with its development contracted by reason of the absence of an adequate amount of capital. He had understood that Capt. Johns had obtained for himself an enviable reputation in Cornwall as a cautious practical authority, and was it likely he (Mr. Dames) would ask that Capt. Johns should sacrifice that high reputation in his connection with Assheton? Let the shareholders as a body put their shoulders to the wheel, and manfully co-operate with their directors. There could be no doubt but that they possessed a really valuable property; and if the shareholders would only come forward, as was their duty to do, there seemed every reason to confidently expect that Assheton would prove one of the best dividend-paying mines in the Principality. (Hear, hear.) Before he sat down he wished to state that he should like to see recorded upon the minutes the cordial thanks of the shareholders to Capt. Johns for the able and energetic manner in which he had developed the mine since he had been the manager. The general management was such as deserved the unqualified thanks of the shareholders, and at the proper time he should move a resolution to that effect. (Hear, hear.)

After some further discussion, the motion adopting the report and accounts was put and carried unanimously.

The CHAIRMAN considered it only a duty to propose that the best thanks of the shareholders be offered to Mr. T. Gundry, for the trouble and expense he had incurred in personally watching the development of the mine, and in many other ways assisting to promote the prosperity of the enterprise. (Hear, hear.) He then proposed a resolution to that effect.—Mr. LINDOW having seconded the proposition, it was put and carried unanimously.

Mr. DAMES then proposed that the best thanks of the shareholders be accorded to Capt. Johns.

Mr. H. W. LINDOW, in seconding the proposition, said it gave him great pleasure to endorse Mr. Dames' remarks. With reference to the management of Capt. Johns, it had given the directors entire satisfaction, and he had no doubt that before very long the shareholders would with the present development find that they held one of the best mining properties in Wales.

Mr. R. DAMES said that before they separated he wished to propose a vote of thanks to the Chairman and directors, and in doing so thought he had the entire approval of the meeting. They must not forget that, owing to the financial condition of the company, the directors had from the first not only refused to take their fees, but had incurred heavy personal expenses in visiting the mine several times in the year. (Hear, hear.)

Mr. T. G. TAYLOR, in seconding the resolution, said he was very pleased with what he had seen. He confirmed Mr. Dames' remarks, and thought the shareholders had reason to be very thankful that they had directors who gave so much of their valuable time, and without receiving any remuneration.

The motion was put and carried unanimously.

The CHAIRMAN, in acknowledgment, said the board had but one object in view, and that was to make the Assheton a successful mine, and to ensure its accomplishment they had sacrificed their time and advanced their capital, and were perfectly willing to continue to do so; and all they asked of the shareholders was their co-operation by subscribing for their proportion of the unissued debentures to ensure that success which all believed would result from further development. (Hear, hear.)—The meeting then separated.

PENRHYN MINING COMPANY.

A general meeting of shareholders was held on the mine on Sept. 19, Mr. H. W. LINDOW in the chair.

Mr. WILSON (the secretary) read the notice convening the meeting, and the minutes of the last were confirmed.

The report of the agents was read, as follows :—

Sept. 13.—In handing you our report for the meeting, to be held on Sept. 19, we beg to confine our remarks to the operations carried out since the last general meeting. The sinking of the engine-shaft has been forced on by a full pare of men, but in consequence of the hard class of ground we had to contend with, we are sorry to say, the progress has not been so fast as anticipated; however, it is now down close 10 *fms.*, and are pleased to say within the last 6 ft. the ground seems to be easing, with the lode split up in branches, and seldom without producing stones of ore; should these branches unite, which is very probable, the result, in our opinion, will be a productive lode. No. 3 shaft is down to the 40, and now sinking for a fork; for this depth it has been in a productive lode, and worth in places 8, 10, and 20 cwts. of lead ore per fathom, and more especially within the last 2 fms. of the extreme bottom, and no doubt when the ends are set to drive both east and west of shaft we shall open out profitable ore ground. The 30, east of flat-rod shaft, is in about 32 fms.; in the last 9 ft. the lode is presenting an improved appearance, about 1¼ ft. wide, containing good looking spar, blende, and fine specimens of lead ore—a very kindly looking lode. We may as well mention that we have a long run of ground here to the boundary. We have cleared up and timbered this flat-rod shaft from surface to the 30; in the same below this level we can drop in 7 fms. of water; we made an attempt to fork it by water barrels, but it became too powerful to be kept by manual labour, consequently it compelled us to attach a line of flat-rods from the engine to this shaft, which will be completed, with main rods and pitwork placed in the shaft, by Saturday next, and the machinery set in motion to pump out the water. This is a very important point; by the information obtained from persons who worked there that at the extreme bottom we shall find a good course of ore, and seeing what has been worked away both east and west of shaft we have every reason to believe it. In conclusion, we have now reached what the mine was first started for—to get 10 fms. under where the former workers left off, and shall quickly be in a position to open out ground to a very great advantage. In No 3 shaft two ends will be set, where the lode in the west end is worth 20 cwts. of lead ore per fathom, and the eastern end 15 cwts. per fm. Two ends also will be put to at the engine-shaft when it reaches the 40, and looking at the change of ground we may expect a speedy improvement at this point, and should the 40, at flat-rod shaft, turn out as above reported, this mine will be quickly placed on a firm footing. We have a parcel of ore, computed 20 tons, and hope shortly to daily increase it.—W. JOHNS, M. WHITFORD.

The CHAIRMAN moved that the report and half-yearly accounts be received and adopted. He explained that good progress had been made since last meeting, and that everything was now in good order, &c., although it would require some time before they could expect any profitable returns, yet there was no doubt eventually the property would prove a remunerative investment.

Mr. T. G. TAYLOR seconded the proposition, and asked Capt. Johns and Capt. Whitford several questions, which were satisfactorily answered.

Mr. WILLIAM GUNDRY said that a large amount of work has been done here. The mine is now nearly cleared throughout; and the whole of the ground for a considerable distance is stoped away by the old people from the 30 to the surface. Below this level everything is standing whole. Two shafts are at the 40, and levels set to drive in a good paying lode. In a few months more, he ventured to predict, they would have a mine realising steady and permanent profits.

The motion adopting the report and balance-sheet was put and carried.

Votes of thanks were passed to the Chairman and directors, and also to the captain of the mine.—The proceedings then terminated.

TAN-YR-ALLT MINING COMPANY.

A general meeting of shareholders was held on the mine on Sept. 19, Mr. WILLIAM NEWLAND RUDGE in the chair.

Mr. WILSON (the secretary) read the notice convening the meeting, and the minutes of the last were confirmed.

The report of the agent was read, as follows :—

Sept. 14.—Since the last general meeting our operations have been chiefly in sinking the engine-shaft and driving the 34. The engine-shaft has reached the 34, and 2 fms. below. About midway from the 24 to the 34 the shaft intersected a slide, which dipped in a northerly and westerly direction; at the latter level (34) the entire lode was cut through, and found to be 6 ft. wide, and driven on its course west 5 fms.; in this drivage the slide came into the forebreast, and by its influence disordered the lode, consequently it is suspended. The same level east is driven 10 fms.; in this end the slide is fast leaving the roof of the level, and as the end is advancing the lode is getting more compact, and producing good lumps of lead, looking very promising. In the engine shaft, which is down over 2 fms. below the 34, we are carrying about 2½ ft. of the lode, from the composition of which, and the ground it is associated with, there seems every chance of a productive lode in depth; before we can proceed any further we are making alterations in the pitwork, in putting a drawing lift at the bottom, and plunger lift at the 24, which will be completed in a few days, and the sinking resumed. I would strongly urge the continuance of the sinking by a full pare of men to get it down as quickly as possible, and in the meantime drive the 34 east; my object in recommending this point is that a long distance is driven over in the 14 in a lode full 14 ft. wide, and its character seldom or ever fails of leading to a course of ore, and more especially as this end is now under the slide, and getting into settled strata of ground. Our former stopes are set on tribute, which are yielding fair quantities of ore. We are in the way of dressing, and hope to get 30 tons shortly for sale. The machinery throughout the mine is in good working order.—W. JOHNS.

The CHAIRMAN moved that the report and half-yearly accounts now read be received and adopted. He was sorry the shareholders had not responded to the call for 2000*l*. on bonus or debenture, which was necessary to prove the mine. The directors had already advanced the company money, and were prepared to subscribe for the debentures, but at the same time he thought it was not altogether fair for the shareholders to look to the directors to find the money for the working of the mine, the ultimate benefit of which would be derived by the shareholders.

Mr. R. DAMES seconded the proposition for the adoption of the report and accounts, which, after a short discussion, was put and carried unanimously.

Mr. WILLIAM GUNDRY said he was of opinion that as the splendid course of lead cut out in sinking as they got near the slide, so he believes now, as they are sinking and getting away from the slide, a very valuable lode will be found, and that in the course of some 6 fms. sinking they will have a very valuable mine again. A finer lode, without being of much value as at present, cannot be seen, and a finer chance of making money than in buying these shares at the very low price they are now at cannot be found.

Mr. T. Gundry and Mr. A. Rawlinson were re-elected directors.

Capt. JOHNS, in answer to one of the shareholders, stated it was his intention to confine operations to the sinking of the engine-shaft and driving, which would not entail a further monthly cost of more than 20*l*.

Votes of thanks to the Chairman and directors, and also to the captain of the mine, concluded the proceedings.

ESGAIR LLE MINING COMPANY

A general meeting of shareholders was held on the mine on Sept 20, Mr. H. W. LINDOW in the chair.

Mr. WILSON (the secretary) read the notice convening the meeting, and the minutes of the last were confirmed.

The report of the agent was read, as follows :—

Sept. 19.—Agreeably with your instructions, I beg to send you a report of the principal operations during the last four months, with the present state and future prospects of the mine. The engine-shaft has been sunk 4¼ fms. below the 34, and is at this time abandoned in consequence of an influx of water, which issues from a branch that crosses the shaft; we shall have to procure a 6-inch drawing lift for this place before the sinking can be resumed. The 34 has been further extended 6 fms. 4 ft. 6 in. west of the cross-cut; for the first 4 fms. of this distance the lode was found to be 7 ft. wide, and worth from 12 to 15 cwts. of lead ore per fathom; the remainder has been driven on the north part of the lode, which is of no commercial value. I should remark that the lode here was found to be very wet, vughy, and expensive to drive on, and thus the reason for our turning a little to the north to make better progress. The same level has been further extended 9¼ fms. east of the cross-cut, the whole of which has been through unproductive ground; the lode in the present end is 6 ft. wide, composed of clay-slate, veins of quartz, and spots of blende. A winze has been sunk about 7 fms. below the 22, which is now only a few fathoms in advance of the 34; as soon as a communication is effected here some good ore ground will be thrown at command. The 22 has been further extended 8¼ fms. west of the cross-cut; the lode has varied from 3 to 5 ft. wide, and worth on an average from 8 to 10 cwts. of lead ore per fm.; the lode in the end at present is 4 ft. wide, and of the same value, with symptoms to further improve. The rise in the back of this level and the winze in bottom of the 10 have been communicated, which has nicely ventilated this section of the mine, and thrown some good ore ground at command. A stope is being worked by two men west of the said rise, where the lode is 6 ft. wide, and worth 1¼ ton of lead ore per fm. Also a stope east of ditto, by four men; the lode here is 8 ft. wide, and worth 1½ ton of lead ore per fathom; we calculate that this branch will hold up to within a few fathoms of the deep adit level. The 10 has been further extended about 8 fms. west of the engine-shaft, the whole of which has been through a very promising lode; this level is now being driven by four men; the lode is all the breadth to the end, and yielding some good stones of lead ore occasionally. Eliza's shaft has been sunk 15 fms. below the adit level; a plat has been cut at the same level 12 ft. long by 10 ft. wide, and 8 ft. high, and the men have now resumed the sinking below the said level; we have here another 15 fms. to sink to bring us to the required depth to meet the 34 coming back against it, and for the further advance of this work a little drawing machine should be erected at the little pumping wheel, the price of which (everything included) would not exceed 4*l*. In the mouth of the deep adit level (the entrance into the mine) the old timber gave way; these have been replenished with new, and the level enlarged and made good up to the rock, which is about 8 fms. in length. Since the last meeting we have erected the new 24-ft. water-wheel, and re-arranged the pumping rods and pitwork, which now answer well. The dressing-floors have been enlarged by the building of two new round buddies and new jiggings on an improved principle, and a new water-wheel, 14 ft. diameter by 5 ft. abreast, for driving the same; these things are now drawing near to completion, the benefit of which will be felt in our future dressing of the ore for market. You will gather from this report that our bottom levels are at this time still poor, but deem it right to remark that there are good bunches of ore gone down above both east and west before us. For the further working of the mine I should propose to continue the bottom levels both east and west, drive the 22 and the 10 west, stope east and west of the rise over the 22, and also one stope over the back of the 10, or more if you think proper. The future returns will be governed by the additional hands that are put to stope. I consider that, on the whole, the mine is opening out westward very well. The 22 and 10 are at this time looking very promising, which speaks well for the 34 when it reaches these points. We shall be prepared to sample from 25 to 30 tons of lead ore again on Tuesday next, Sept. 26.—JOHN WILLIAMS.

The CHAIRMAN moved that the report and balance-sheet as read be adopted, which was seconded by Mr. R. DAMES.

Mr. WILLIAM GUNDRY said that they were making fair progress in sinking Eliza's shaft; when sunk to the 34, and lode cut, they will be in a fine position to work the western ground. The new machinery for dressing has just commenced working, so that the returns will increase. The new pumping-wheel answers well, and underground they are opening out good lead ground, and shortly be entering two fine runs of ore at the 34, east and west of pumping shaft, gone down in bottom of the 22.

Capt. J. WILLIAMS, having fully explained to the meeting the progress made, said it was his intention (subject to the approval of the directors) to continue the sinking of Eliza shaft with all possible speed. The mine was looking very promising, and on surface everything was in good working order.

Several questions having been satisfactorily answered by Capt. WILLIAMS, the motion adopting the report and accounts was put and carried unanimously.

A vote of thanks to the Chairman and directors terminated the proceedings.

FLORIDA SILVER-LEAD MINING COMPANY.

A general meeting of shareholders was held on the mine on Sept. 2[illegible], Mr. H. W. LINDOW in the chair.

Mr. WILSON (the secretary) read the notice convening the meeting, and the minutes of the last were confirmed.

The report of the agent was read, as follows :—

Sept. 15.—We beg to hand you our report of this mine and account of the work that has been done since the last meeting up to the end of August. Ellen's shaft has been cleared from the 10 to the 20 *fm.* level below adit; the shaft has been timbered down and divided and cased, and 10 fathoms of pumps have been put down with good ladder road to the bottom. We have cleared the levels east and west of Ellen's shaft. In the eastern level we have got a pair of men stoping the lode is worth 12 cwts. of silver-lead ore, and about 8 cwts. of blende per fathom; here we have also two men driving a cross-cut to the south to prove the lode—we have seen some fine branches of lead. As we have not driven any east and west on the lode, so we are not able to put any value. In the western end from the shaft we have got two men driving a cross-cut north, and in the cross-cut we have passed through some fine branches of lead ore, also we are not able at this point yet to give you any valuation of this lode. The 10 fm. level, east of Ellen's shaft, is to-day fully worth from 20 to 2[illegible] cwts. of lead ore per fathom, and looks likely for further improvement; on the north branch of this level we have got a pare of men stoping blende; the lode here will produce from 15 to [illegible] cwts. of blende per fathom. The 10 fm. level, west of Ellen's shaft, is looking very promising for further improvement; the lode here to-day is worth 12 cwts. of lead ore per fathom. The deep adit level, east of cross-cut, is worth 25 cwts. of blende per fathom. The No. 1 stope, west of Percy's shaft, is worth from 16 to 18 cwts. of blende per fathom. The No. 2 stope, west of Percy's shaft, is worth 13 cwts. of lead, and 7 cwts. of blende per fathom. No. 3 stope, west of Percy's shaft, is worth from 6 to 7 cwts. of lead, and from 10 to 12 cwts. of blende per fathom. No. 1 stope, on the south branch, is worth from 12 to 14 cwts. of blende per fathom. No. 2 stope, on the south branch, is worth from 13 to 15 cwts. of blende per fathom. We have stoped since last meeting 163 fathoms of ground for blende, and 72 fathoms of ground for lead, and we have driven and cleared in different parts of the mine over 80 fathoms; we have erected one new water-wheel, and six trunks and launders complete for dressing the slime ore, and we have erected four jigging hutches, also completed the pond or embankment at the Teivy pool, also built a house for the boat of the Earl of Lisburne, also bins for keeping the blende. We have got on the mine as plant five water-wheels, two crushers complete, eight jiggers working by hand labour, two self-acting jiggers, two flat buddles, two round buddies, eleven trunks, and one ore-house, office, carpenters' shop, smiths' shop, and material house all complete. We are glad to inform you that our machinery works well both on surface and underground, and in fact we consider that everything is looking very encouraging.—J. WILLIAMS, T. WILLIAMS.

The CHAIRMAN moved that the report and balance-sheet be received and adopted, which was seconded by Mr. T. GUNDRY, and carried unanimously.

Mr. WILLIAM GUNDRY said that having just now got to the bottom of the mine, which is the 20 fm. level, they may consider they are entering on prosperity. The amount of work done, considering they have only been 18 months about it, is very great. The new ground now developing is opening up satisfactorily, and by continuing the levels particularly east to get under the old Roman workings, there is little doubt of having a good mine.

The directors inspected the mine under the guidance of Capt. Williams, who fully explained all that was being done for its profitable working.

Votes of thanks to the directors and captain terminated the proceedings.

PERRAN CONSOLS MINING COMPANY.

At the meeting of shareholders, held at the offices of the company, Ethelburga House, Bishopsgate-street, on Wednesday, the accounts to the end of August last showed a debit balance of 687*l*. 12s. 2[illegible], with 3000*l*. worth of tinstuff in reserve.

A call of 2s. 6d. per share was made.

The report of the agent was read, as follows :—

Sept. 26.—The flat-rod shaft is completed to the 40, or 6 fathoms has been sunk since the last meeting. We have made but poor progress here, on account of insufficient power to keep the water; in fact, the shaft should have been at least 10 fms. deeper, and 50 fms. of levels opened out at the 40. We are pleased to say in the sinking of this 6 fathoms the lode has greatly improved, and is worth for the whole distance 5*l*. per fathom; the present bottom of the shaft is of the same value, and the strata in about the lode is everything we could wish for the production of tin. Since the last meeting we have opened in the 20 for 25½ fms., mostly by the side of the lode; the present end, for the part carried, is worth 4*l*. per fathom. About 10 fms. behind this end we have communicated a rise to the 20, which has not only given good ventilation, but has well proved that the tin ground holds good from level to level, and worth on an average from 7*l*. to 8*l*. per fathom. We have cut through the whole lode in several places west of the cross-course, and find the lode is strong and masterly, but none of the other lodes bear any comparison as to value or character. It is from 8 to 10 ft. wide, and more or less tinny throughout. Two stopes have been back and side of this level are worth 6*l*. and 8*l*. per fathom, respectively. We have only 12 fms. of this level to ouched, the rest is whole ground from level to level. The 30 east has been extended 7 fms., and small and poor throughout. As stated in our last report for the general meeting, we have cross-cut to

outh part, and find the best part of the lode is standing, which is 2 feet wide, worth 3*l.* per fathom; this end is now approaching the ore ground gone down n the 20, and. from the appearance of the lode to-day, I have no doubt we have profitable piece of ground here to open up. The 20 is driven 8½ fms. west of he western shaft; the lode in the present end is full 4 ft. wide, worth 7*l.* per athom; this end, being 22 fms. in advance of the 30, speaks well for the bottom f the mine. A stope in back of this level is worth 8*l.* per fathom. We have uspended the driving of the 20 east, the lode being poor and disordered by a ide. The western shaft is completed to the 20, with plats cut, and the men ill commence to sink below the 20 in a few days. The lode in the shaft is 3 ft. ide, worth 5*l.* per fathom. We have cleared the adit and repaired the level, ut find to make the flat-rod shaft thoroughly secure we shall have to cut abroad he shaft from about 5 fms. above the adit to the 10, and re-timber it, which will ause for about a fortnight a temporary delay in the drawing of the tinstuff. We have cleared up Wheal Stillborn shaft, and secured it to the bottom, 16 fms. rom surface. We find at the 10 a level is driven east about 6 fms., through a ery kindly lode indeed, being 2 ft. wide, and producing paying stamping work. At the 16 a level is driven east 7 fms., and the lode is 3 ft. wide, producing good tones of tin. From samples I have taken of the lode it will produce from 16 lbs. o 17 lbs. of tin to the ton of stuff, and, as far as I can see at this shallow depth, ery few lodes present such indications, and so productive. I would recommend to o as much as possible during the summer, the lode warranting a spirited trial. We have now 10 tribute pitches working by eighteen men and five boys, which re yielding fair quantities of tin. I have much pleasure in congratulating the hareholders on the continued improving prospects of their property, and had ve the necessary appliances for keeping the water, discharging the stuff, and ore stamping power, our accounts would have shown a very different side to hat they will to-morrow. I again must urge on you the propriety of erecting least a 50-in. engine, with 12-in. pitwork, immediately on the western shaft, eing fully satisfied that the mine with the present power will be in great danger f being flooded during the coming winter; in case it should, it will take undreds of pounds to clear and secure the mine again to its present state. uring the last six months we sold 26 tons 7 cwts. 3 qrs. 3 lbs. worth of tin, ailsing, with carriage, 1952*l.* 10s. 8d. The mine never looked so well as at resent since my connection with it.—J. NANCE.

[For remainder of Meetings see to-day's Journal.]

A TRIP THROUGH THE UTAH TERRITORY, U.S.

A VISIT TO THE MINES.

We left Salt Lake City at 7 A.M. for Little Cottonwood canon. our and six horse coaches, owned by Chislett and Co., run from alt Lake to Emmaville and Central City, and the distance to the tter place is 30 miles. Passing to the south, we follow the Wasatch nge of mountains for about 18 miles, and then up what is known s Little Cottonwood canon, passing Emmaville, Granite, and Tanerville on the way, and arrive in the evening at Central City. The ad up the canon is rough and steep. At the mouth of it we passed e smelting-works of J. C. Bateman and Co., where there are two Blitz's furnaces, 3 feet 6 inches diameter, with 5 tuyeres. The furaces have a capacity of about 10 tons per day. The fire-clay used omes from Camp Floyd, in this territory, and answers the purpose quired very well. The charcoal used is from Truckee, and costs c. per bushel. A fine water privilege and a turbine wheel furnish e power to run one of Root's patent blowers. They are running ght and day on ore from the Flagstaff Mine. At Granite City e Mormons are quarrying stone for their new temple, though at resent but few men are employed. At Tannerville there is a smeltg furnace of 20 tons capacity, owned by Messrs. Jones and Pardee. ey are running day and night, and are doing well. A new furace is at present in process of construction.

Central City and Alta may be spoken of as one town, as they are close together. The elevation is 8300 ft., and the population bout 600. There are two butchers' shops, one hotel, restaurant, two ores, and a few saloons. This situation so near what are without oubt some of the richest mines in the United States will eventually ause the place to become a good camp. The hills are being proected for chlorides daily, but there is no excitement, and the disict has come into notice on its own merits, and I will say that toy it has one of the largest paying mines in the United States. The ountains in the vicinity abound in timber fit for mining purposes, nd there is plenty of water running down the canon. On the high ountains near by the snow lies 8 to 10 ft. deep all the year round, nd the roads in winter are almost impassible for teams.

THE EMMA MINE.—I was naturally anxious to see this far-famed mma Mine. I walked up about half a mile from the city on the de of a range dividing Big and Little Cottonwood canon to see it. had the pleasure of going through it in company with the superindent; we passed up from the office to the large ore shed. The e is taken from the mine, and dumped down the incline to the ed, where it is sacked, and sent to Salt Lake City. There are six en engaged in filling and six in sewing the sacks, which hold from to 100 lbs. each. The ore is soft and decomposed, and like fine rt or sand. There are 100 two-horse wagons engaged in hauling e, and I am informed that last month they carried about 95 tons ily on an average. This mine was located in 1868 by Mr. J. F. oodman, who sunk a shaft about 125 ft. deep before striking any rge body of ore. He followed down a small streak of red-coloured itter known as red ochre, which is considered as a good indication this district. There have been a few side drifts run north and uth from 12 to 16 ft., in one of which they struck it, and sunk 65 ft. rough the solid body of rich ore. They have run a tunnel through solid formation 405 ft., beginning near the original discovery aft, and here they struck one of the largest bodies of ore I have er seen. At the end of the tunnel we find ourselves in a large room cavern, timbered in a substantial manner, bearing evidences of gineering skill and good workmanship. From the level of the nnel may be seen 11 floors or galleries, each 71 ft. in length, 26 ft. de, and 7 ft. in height. From the galleries they are still taking t ore. The timbers used are 10 in. square and 7 ft. long, and the s and caps are of equal dimensions, making a solid square frameork. The deposit dips at an angle of 50° to the north-east, and e lode or body of ore runs east and west, and shows, it is said, an en fissure at the eastern end. In this chimney to the right, and ow the tunnel level, a shaft has been sunk 93 ft. deep. At 60 ft. y run another level, from which they are now extracting about same quality of ore as above. They are still sinking this shaft, it seems to be a large deposit, and of an unknown length. It is id that nine-tenths of all the ore taken out is sacked for shipment. ere are 45 men employed on each shift, and four carpenters are pt busy preparing timber. The ore, oxide, and carbonate of lead ntains a high percentage of silver; it will average from 35 to 40 r cent. of lead, and assays from $190 to $200 per ton in silver, th a small proportion of gold, $3 to $7. The richness of the ore s increased with the depth, and it is easily worked, since it requires blasting. The vein is in limestone formation, and the ore aves about $135 profit, after paying all expenses of mining, haul, and reduction. The principal purchasers of this ore are Messrs. th and Son, Liverpool, England, and they send it to the Swansea elting Company for reduction; latterly, however, small parcels ve been worked here in the territory. The average daily shipnt for last month was 112 tons, which at $135 per ton would be ,120 per day, and multiplied by 365, gives the wonderful product a year's run at this rate as $5,518,800. The owners of this wonful mine are—Messrs. T. W. Park, of New York; Jas. M. Day, Illonois; H. H. Baxter, of New York; Walker Brothers, Salt ke; Capt. James Smith, Salt Lake; Warren Henry, of the First tional Bank of Utah; and W. W. Chisholm, of Salt Lake City. y claim 3000 ft. on the lode.

The NORTH STAR MINE is located a few rods from the old proct shaft of the "Emma," and is a good mine. I understand that was taken up in 1865 by Brain and Nichols, though the Discovery ft was sunk but a few feet. They own two locations on the ledge, North Star, running north-west, the St. Louis, a south-easterly rse. The North Star tunnel is in 110, and the incline 210 feet; ledge is from 3 to 6 ft. in width. The ore yields 60 per cent. of d, and about 100 ozs. of silver to the ton. It was formerly shipped England, but is now worked at Robbin's furnace. Mr. D. C. hols is superintendent.

UTAH MINE AND TUNNEL is located 800 feet west of the Emma se. Six men are employed, and they are now through the lime k 100 ft., and hope to strike either a "blind" ledge or one of se that they own on the hill. R. Y. Anderson, of San José, California, is superintendent.

The LITTLE COTTONWOOD MINING AND TUNNEL COMPANY are ning a tunnel a short distance above the "Emma," on the hill ; Mr. T. F. Muller is superintendent. On this hill, which pitches t 45°, there is a tramway running nearly to the top, and built M. W. A Lyon, for the purpose of taking ore from the mines tha are up on the "divide." The gauge is 12 in., and three rails are used. It runs a distance of 1265 ft., and at the end of it is situated the

SAVAGE MINE.—Which was located in June, 1870, and is owned by Walker Brothers and Wall and Co. They have an incline down 100 feet, then a shaft 60 feet, and then another incline 40 feet following the ledge, which dips east, all the way. There are 70 tons of good ore on the dump and a large quantity not sacked up, and on account of the inclemency of the winter there was no chance to ship it, although they continued taking it out. The ore averages, I have been informed, about $300 per ton, and that which is first-class will go even higher. There are fifteen men at work, at wages from $2 to $2·50 and $3 per day and board. Work is carried on day and night. The intentions are to tap the ledge by a tunnel 100 feet below the level of the place where the men are now at work. The average width of the lode is 4 feet, although in the lo wer incline it shows itself on all sides. A few feet from the Savage is the

MONTEZUMA, another good mine, owned by the same company, and taken up in June, 1870. The incline is in 280 ft., and the vein is about 4 ft. wide. There are 10 men employed: 300 tons are on the dumps, awaiting shipment to the smelting works. It averages about $125 per ton. The lode runs north-east, and the ore is carbonate and oxide of lead.

The EAGLE LODE is a short distance from the above mine, and is only a few feet on a vein running parallel with the Savage and others. The ore looks well. Further up the hill, and a few hundred feet west, is the famous

FLAGSTAFF MINE, where there are nearly 200 tons of ore on the dump, being sacked for shipment. The superintendent being absent, I did not enter the mine, but it is said by all to be first-rate, and equal to the Savage. Climbing the hill, and passing along the ridge of the "divide," we arrive at the

DAVENPORT MINE.—The shaft is 25 ft. deep, and then comes an incline of 60 ft., all in ore that will average by smelting process, I am told, $150 per ton. The character of ore is grey and red carbonate, and oxide of lead.

The Center Mining Company, south-west of Howland, Prest., is located near the Emma, on the east side, and they have sunk a shaft about 35 ft. deep. Incorporated June, 1871.

The end of the Big Cottonwood canon is known as Silver Fork, and among the principal mines are the Prince of Wales and the Highland Chief; the Reed and Brown is also a good mine, and is considered a true fissure vein.

The Utah Southern Railroad is now being extended along the foot of these mountains, and a branch track is expected to reach the mouth of the canon. This will greatly facilitate transportation, and materially decrease the number of teams which now crowd the roads. With the advantages possessed by this camp in its undoubtedly rich mines, abundance of wood and water, accessibility, and facilities for transportation, we can safely predict for it a brilliant future.

—*Scientific Press* (San Francisco), Sept. 2.

UTAH.—The well-known Sparrow Hawk, Last Chance, and Marion Mines, in the Camp Floyd district, have been bonded to Capt. E. H. Shaw for 60 days, for $158,000 gold.—Big Cottonwood: Cor. of same: The Hawkeye furnace is being built with three cupolas, calculated to run 25 tons of ore per day. It will have a Galmador, or Spanish reverberatory, for matting ores. The Good Samaritan Company are making arrangements to put up a furnace, establish a store, with a sufficient stock of general goods, build boarding-house, &c. Two other mill sites have been marked out and located for similar purposes.—Bingham: Bristol and Daggett have in successful operation an extensive smelting-furnace for the working of their ores. The yield of bullion is from 3 to 4 tons every 24 hours, the actual assay value of which is $300 per ton, coin. The Winnemucca Company have a vein of ore nearly 17 ft. in thickness, that will average $115 per ton and 28 per cent. lead. The ore from the Spanish mine averages $25 per ton in silver and 32 per cent. lead. The majority of the mineral veins in the belt of mineral running across the head of the Cottonwood, that are but partially opened, show large deposits of ore, assaying from $100 to $300 in silver per ton. The Heaton tunnel is a big fortune to its owners, one hand being able to take out from $25 to $40 in three hours.—*Ibid.*

THE TIN TRADE IN AMERICA.—Among the multitudinous mines in the United States there are no mines of tin known at present of sufficient value to pay for working. Cornwall—the extreme south-west county of England—has rich deposits, but no others are noted for their value. Consequently most, if not all, of the tin used in America must be imported, and nearly all comes from the East Indies. The great supply comes from Malacca, and is known in the market as "Banca" and "Straits" tin. The best quality is thought to be the Banca, which is made under the direction of the Dutch Government there, and owing to their honesty has maintained a high reputation. The Straits tin is manufactured by private companies, and the quality is not so good. It comes in slabs to market, and the greatest part is brought into New York. The importation of the week before last was 45,728 lbs., making 2,691,410 lbs. for the year. This is a half million less than the same period in 1870. The pure metal is used in manufacturing brass, for trimming copper for various purposes, for making Britannia ware, block tin pipe, and for a thousand different things. Only a small quantity of English tin is imported to this country in slabs, but enormous quantities are imported in the form of tin-plates (tinned iron). The entire supply comes from the mines at Cornwall and Wales. It is sent to Liverpool, where it is manufactured and prepared for export. The imports for the last week were 28,940 boxes, making 411,029 boxes since January 1. During the same period last year the importations were 640,032 boxes. The price during the war was low for slab tin, being from 19 to 22 cents, gold, for Banca, but recently the price has gone up to 35 to 41 cents, gold. About $5,000,000 is invested in this business about half of which is in New York city.—*Daily Bulletin* (New York).

AN IRON INSTITUTE IN AMERICA.—The features of the week have been the re-assembling of iron men from all parts of the country to form a national association and discuss trade topics. The delegation was a large one, and comprised both bar iron and nail men from north, south, east, and west. The attendance was a very fair representation of American manufacturers, and, to a critical observer, was clearly above the average of the type. Most of the gentlemen present were the architects of their own fortunes, and represented an aggregation of over $100,000,000. The great feature to a stranger in the appearance of these men was the extremely practical expression of face, form, and speech which all alike bore, although all the differences of locality and section were strongly marked. The address of the president, Mr. J. J. Bennet, of Pittsburg, was all that concerned the public, and beyond this the proceedings were of a strictly trade character. The meeting resulted in its object—the formation of a national association, under the title of the "National Association of Manufacturers of Bar and Merchant Iron." The further objects, as understood, are the interchange of views on trade subjects, and a thorough information of all members on subjects of importance to the trade. As the nucleus of what bids fair to become a powerful adjunct to the prosperity of American manufacturers, this association is noteworthy, and the only wonder is the trade has been without so long. The Nail Makers' Association also met and transacted business of importance to the trade.—*The Iron Age* (New York), Sept. 14.

CALIFORNIA—IMPORTANT MINING SALES.—Mr. H. Guttierez, of the Stock Exchange, London, paid out on Monday last $200,000 on the purchase of the Independence Mine, at Sierra Buttes, Sierra county. Mr. Guttierez has also bought the Pacific Mine at Placerville, California, and is interested in the purchase of the Buel and Bateman property at Bingham Canon, Utah, at $400,000, made some three weeks ago. Several other prominent mines have been bonded to this gentleman for sale, which are likely to go into English hands. He brought his own mining engineer, Capt. Bray, of London. They both return to England this week after a quiet but very important visit. Thus some of the very best and safest of our mining property is passing into foreign hands. We have the satisfaction of knowing, however, that there are plenty of the same kind yet undeveloped.—*Scientific Press* (San Francisco), Sept. 2.

BENDIGO GOLD FIELDS.—In making up the yields, dividends, and calls for the first half of the present year, a very satisfactory state of matters is revealed with regard to "Mining on Bendigo," and there are many of our best claims that are only commencing to pay dividends, and many that paid well the former part of 1871, that are fully expected to give much larger amounts during the latter part of the year. The calls are, perhaps, heavier than during any previous half-year, but this is by no means an unhealthy state, seeing that a very large amount of progressive work is being carried on in all parts of the district, which will in a great many instances ultimately prove remunerative. The dividends may be considered exceedingly satisfactory, and are larger than any previous half-year's declarings.

The yields of gold as reported purchased by local banks amount to 117,227 ozs. 12 dwts. 2 grs., or to the value of 449,786*l.* 14s. 3d. for the six months. The calls have averaged 12,340*l.* per month, making a total of 74,039*l.* 14s. 2d.; this, of course, represents the calls on a very large number of companies. Coming to the dividend list, we find that dividends are nearly double the amount, being 147,575*l.* 3s. 8d., leaving balance over calls of 73,535*l.* 9s. 6d., and the amount paid in dividends represents 48 companies only. Whilst these satisfactory returns can be reported, there need be no fear as to the great permanency of this gold field, and it is a matter of great satisfaction that during the half-year the greatest depths at which quartz has been obtained has proved stone to be equal in richness, if not richer, than anything from the surface downwards. Looking at the different lines of reef, the Garden Gully has proved itself the best ever opened up in this district. Ten companies alone have returned to their shareholders 64,012*l.* 19s., three of these companies only having paid their first dividend for the half-year during the past month, and whose mines are looking very prosperous. I allude to the North Garden Gully, Central Garden Gully, Garden Gully Tribute. The New Chum and Victorian lines, which may be considered one and the same, come next in the list, with 25,389*l.* 8s. The Johnson's Reef line paid 12,775*l.* The Hustler's line is much below that of last year, but a great improvement is certain for the present half-year; the amount paid is, only by one company, 9100*l.* The Bird's Reef line has not done amiss with 6903*l.*; the balance is distributed on various lines, and the Deep Leads Huntly. Taking the individual companies, the Unity, Garden Gully, heads the list with 5866 ozs. 15 dwts. 12 grs., out of which they declared 18,000*l.*, besides paying for machinery. The Victorian Reef Gold Mines paid 12,164*l.* 8s. out of yields amounting to 5001 ozs. 4 dwts. The Victory Company, Garden Gully, gives 9781*l.* 4s., out of 4083 ozs. 12 dwts., and paid for machinery. The Old Chum Company paid about 9350*l.*, their yields not having been published previous to registration. The Johnson's Reef dividends are divided between the North Johnson's and the Rose of Denmark, the former giving 7975*l.* and the balance 4800*l.*

Yields, 117,227 ozs. 12 dwts. 2 grs., value	£449,786 14 2
Dividends, January to June	£147,575 3 8
Calls, January to June	74,039 14 2
Balance in favour of dividends	£ 73,535 9 6

—*Dicker's Australian and London Gazette.*

FOREIGN MINING AND METALLURGY.

There is nothing very special to report with reference to the Belgian iron trade. Orders continue to arrive regularly at the works, and the production is also regularly disposed of without any sensible variation in prices. The administration of the Belgian State Railways proposes shortly to let contracts for 40 locomotives. The Liége and Maestricht Railway Company is about to increase its plant, 50 trucks, to carry 10 tons each, having been recently ordered; 42 of these trucks are to be devoted to coal traffic. Considering that the line is only a small one, the addition made to its stock of plant will be of some relative importance. The Belgian Railways Working Company has just obtained an order for 200 coal trucks for the Royal Sarrebruck Collieries Railway. A blast-furnace, which the Marcinelle Metallurgical Company has constructed upon a new model, has just been lighted; this furnace is to be devoted solely to the production of casting pig.

The Paris copper market appears to be emerging from its prolonged torpor, and a certain amount of business is being done. Prices have not been established, however, in a very stable fashion. Chilian in bars, delivered at Havre, has made 71*l.* 10s.; Chilian in ingots, 77*l.* 4s.; tough English, 76*l.*; and Corocoro minerals (pure standard), 73*l.* per ton. At Havre a certain amount of languor has prevailed; at the same time, an occasional animation has been induced by a large transaction now and then. A lot of 10 tons, first marks, recently changed hands at 72*l.* per ton, Paris conditions. Some lots of Corocoro minerals have also changed hands at 72*l.* 16s. per ton, Paris conditions. Imports appear to be increasing. At Marseilles, Spanish copper has been quoted at 72*l.*, refined Chilian and Peruvian at 74*l.*, and red copper at 84*l.* per ton. The aspect of the German copper markets continues favourable; all descriptions are firmly maintained, although there are no very great variations in prices. At Hamburg copper has been in good demand, and prices have been very firmly supported. There has been no change in copper on the Dutch markets. At Paris, Banca tin, delivered at Havre or Paris, has made 146*l.*; Straits, 143*l.*; and English, delivered at Havre or Rouen, 139*l.* per ton. At Marseilles, Banca has made 142*l.* The German tin markets have remained quiet, and have not given rise to any very important operations. There has been no change to note upon the German and Dutch lead markets. At Paris, French lead, delivered at Paris, has made 18*l.* 16s.; Spanish, delivered at Havre, 18*l.* 8s.; English ditto, 18*l.* 12s.; and Belgian and German, delivered at Paris, 18*l.* 16s. per ton. There has been no very notable activity in zinc upon the German markets. At Marseilles, Silesian in plates has made 24*l.*; re-cast zinc 18*l.* 8s.; and rolled zinc 28*l.* per ton.

There is not much change to report in the French iron or coal trades. The Mines de la Loire Company will pay on Oct. 16 a first dividend of 3s. 4d. per share, on account for 1871. It appears that the net profits realised last year by the concern known as the Forges et Chantiers de la Méditerranée amounted to 68,188*l.* The dividend for 1870 is to be 3*l.* 4s. per share upon the 16,000 shares of the company, absorbing 51,200*l.*, and leaving 16,988*l.* to be carried forward to the credit of 1871. M. Dupuy de Lôme, it will be remembered, is a prominent director in this undertaking. The important French mechanical undertaking, known as J. F. Cail and Co., and which has produced large profits to its shareholders, is being re-organised. M. Cail, the founder of the enterprise, died a few months since. The Aubin establishments of the Orleans Railway Company produced in 1870, 173,906 tons of coal, 22,020 tons of rails, and 503¼ tons of argentiferous lead minerals. These results differed but little from those obtained in 1869. It should be added, moreover, that at the commencement of last year a series of accidents occurred at the forge, which occasioned repeated suspensions of the operations. A notable augmentation took place last year in the price of labour, and the total profit realised fell consequently to 21,110*l.* Certain expenses incurred last year in connection with the purchase of land, increase of tools, &c. were charged to revenue, and the adoption of this course further reduced the net profits realised to 10,860*l.*

Contracts for the additional rolling-stock proposed to be placed on the Belgian State Railways were let on Wednesday. The number or coal wagons ordered was increased from 420, as originally proposed, to 1020; the number of rail trucks ordered remains at 204. The quantity of new rolling-stock placed at the disposal of Belgian industrials will be seen to be very considerable, and there should, one would think, be some diminution of the complaints heard on the subject. The only complaint which the firms and companies interested now make is that the new plant was not ordered six months since. Freights from Belgium to Paris display a continued tendency to advance. The fact must not be overlooked that the season will shortly commence for the conveyance of beetroot, which gives always special animation to the coal trade, in consequence of the large quantity of coal which the sugar works require. This year, it appears, will be an exceptionally heavy one in respect to the cultivation of beetroot, and the result would be very satisfactory to coalowners if there were a sufficient supply of rolling-stock, but this is not at present the case, and it seems probable that freights will experience a further important advance. The Monceau Blast Furnaces Company will pay, Oct. 1, a first dividend for 1871 of 1*l.* per 20*l.* share.

FOREIGN MINES.

DON PEDRO NORTH DEL REY (Gold).—Telegram from Lisbon: Weighed to August 29, 11,193 oits.; estimate for August, 14,193 oits.—Comparison: Now advised—cleaned up, 11,193 oits.; estimate for month, 14,193 oits.—Previous month: Cleaned up, 12,553 oits.; estimate for month, 14,553 oits.—Corresponding month last year: Cleaned up, 6039 oits.; estimate for month, 7539 oits.

EBERHARDT AND AURORA.—The directors have just received 21 bars of silver, valued at 5360*l.*

UTAH.—Capt. Nancarrow, Sept. 6: We have at last succeeded in running the furnace successfully. We got out last week 21 tons of bullion, and we shall go on increasing from day to day. Our new furnace is a copy of those running at Eureka, and there they answer most admirably, and will do the work of two. We will send a large lot of bullion into the market in a short time. My opinion of the property is not at all changed from the first.

PACIFIC.—Capt. Prideaux, Lander Hill, Sept. 2: The ledge in the rise at the 550 ft. level is worth $850 per fathom. The ledge in the sump-winze is worth $650 per fathom. The ledge in the north cross-cut is worth $700 per fathom. The ledge in No. 3 stope is worth $500 per fathom. The ledge in Nos. 6 and 7 stopes is also worth $500 per fathom. The ledge in No. 5 stope is worth $300 per fathom. We shall in about one month have a piece of ore ground opened 500 feet long and 280 feet high. The ground in the north cross-cut is being opened as fast as possible. As soon as I can make arrangements for carriage I shall send 100 tons of ore to Mettacom mill. I will send deeds of the four ledges which have been added to the company's property in my next letter.

BATTLE MOUNTAIN.—Capt. Richards, Sept. 7: The 73 ft. level is extended 227 ft. north of the Virgin shaft; the lode is poor at present, but is showing signs of improvement. In Truscott's winze, sinking in bottom of this level, we have had some hard ground; the lode, however, has produced some good ore, and is opening ground which will pay for stoping. The 37 feet level is now a distance of 165 ft. north of the Virgin shaft. The stopes in the back of the 113 continue to produce fair quantities of ore. I have already informed you of 1271 sacks of ore being shipped to England per Rockeby Hall, 108 tons, since which there has been shipped to Liverpool 1138 sacks of ore, 71½ tons, and there is now at San Francisco 1232 sacks; at the depôt, 246 sacks; and at the mine, 155 sacks.

YUBA.—A letter received on Sept. 27, from Mr. Mattingly, dated Aug. 20, states that he has succeeded in getting things so organised and arranged that he might say they are now fully at work with as much force as can at present be judiciously or economically used. On Aug. 28 he started the mill to work crushing ore or quartz, having a few days previously started up to make such tests and trials as were necessary to see and know that all worked properly, and to make such changes or alterations as were necessary. The mill works well, entirely satisfactory so far, and the indications are that the results of its working will be favourable, and equally satisfactory. He should try to get sufficient ore out of the Leonora Mine to keep the mill constantly running. They are now hauling ore from the mine, and have five men, as many as can at

present work to advantage, in the mine, extracting ore; in a few weeks, when more are opened, they will have no trouble in getting out all the ore the mill can work. There are five men at work in the Stanley, straightening the tunnel and driving forward the main drift or tunnel through which to work the mine. In the drift there is good ore, but they are not taking out any except that through which the tunnel runs, at it cannot be worked until pans and settlers are put in the mill, which he is making all necessary preparations to do at as early a date as possible. Cash expended to date for materials, tools, supplies, labour, freight, &c., £5435. This does not include the order and bills for four pans, settlers, and other machinery at San Francisco, which amounts to $3750, and the freight upon which will be near $2000 more.

ECLIPSE (Gold).—Mr. H. Tregellas, Sept. 3: General Operations: Our operations in the erection of our new water-mill have been retarded by the delay of four weeks in receiving our water-wheel (turbine), and to make matters worse, no pillow blocks for the shafting of said wheel have arrived to date. I, however, have telegraphed for them to be sent on by stage, so, in all probability, the missing parts will be here in a few days, when we will soon be stamping [stamping would commence, as advised by telegram, on the 25th.], the stamps being ready to turn on the water at once. In the meanwhile we have not been idle, having built a house over all the machinery, made a large reservoir at the end of the water ditch, and other very necessary work that, had we the ironwork here of water-wheel, would have been delayed till the mill was running.—Tramway: We are progressing finely with the construction of our tramway, which, I think, will now be completed in time for the mill, when we will save 8s. per ton in hauling quartz from mine to mill.—Mine: We have resumed operations at the mine at the 300 ft. level, where we have a good lode; other levels will be driven shortly, and stoping commenced. We have about 1500 tons of quartz at the surface ready for the mill, and an unlimited supply in the mine. I hope in my next to be able to report the mill running, the delay of which being entirely caused by the non-arrival of the required ironwork.—Smelting Works: We are commencing to make the bricks for the smelting furnace, but considerable time yet will be required to finish it, as we have been almost entirely engaged on the completion of the stamping mill and its requirements.

[For remainder of Foreign Mines see to-day's Journal.]

HOLYFORD MINE, Tipperary—*(from a Correspondent).*—A sad occurrence took place at this mine (now being worked by the Reafadda Mining Company of Manchester) on Friday morning, Sept. 22. John Neill, an old and highly-valued miner, with his son and son-in-law, went to work on Thursday night at 10 o'clock, sinking a new shaft. Neill's two companions were working in the shaft; his part was to remain on the top to draw up the stuff and his companions, and to let them down by means of a rope and kibble attached to the windlass. At about three o'clock on Friday morning the unfortunate man Neill fell down the shaft, a distance of 6¼ fms., but from what cause it is unknown. His companions had a very narrow escape that he did not fall on them. The three had to remain at the bottom of the shaft till six o'clock, when the next core came to work. Neill was a heavy man, about 50 years of age; he received two severe cuts in the head, and several bruises on the body. Messengers were at once dispatched for medical aid, and three doctors were in constant attendance upon him; they had no hopes of saving his life; he remained unconscious to the last, and expired on Saturday evening at six o'clock. Too much praise cannot be given to Capt. John Phillips, the resident agent at the mine, for the active part he took in relieving the poor man in every possible way. A Coroner's inquest was held on Monday, and after hearing all the evidence brought in a verdict of "Accidental Death."

THE SOUTH WALES COAL FIELD.—The report of the Commissioners on Coal says that the division of the South Wales coal field extends from Pontypool and Abersychan, in the east, to the Glyncorrwg great fault, on the west, about 24 miles, and from Llanharry, on the south, to Hirwain, on the north, about 16 miles. The whole of the area within the containing outcrop of the mountain limestone is about 425 square miles. The coal seams dip conformably with the limestone towards the centre of the basin, at an angle which varies considerably in different parts of the field. Along the northern crop the dip is from 3 to 4 inches in the yard, increasing as it trends towards Pontypool and Cwmbran, where it is 9 inches. It continues to increase along the southern crop, being about 12 inches between Risca and the Taff, and from thence to the Ogwr about 18 inches. This part of the basin is perfectly free from the intrusion of foreign rocks, but it is traversed by a saddle or anticlinal line, which lies east and west, in a somewhat sinuous course from the Ebbw, a full mile north of Risca, by Pontypridd and Tonyrefail, across the lesser Ogwr, by Nanttyrus and the Maesteg Ironworks, through Baglan, beneath Swansea Bay. The basin is thus divided into a northern and southern portion, the latter being one-half of the area of the former. It also happens that this line of elevation is so placed as to be nearest to the side of the basin at which the natural dip of the coal seams is the greatest, so that it brings actually to the surface seams that would otherwise be at a great depth, and probably also lifts the deepest seams to within a workable depth. The position and effects of this anticlinal are shown upon the transverse section of the coal field laid down about 1843-4 by the Ordnance Geological Society. This is the only anticlinal known in the basin; any others that may exist are local only, and unworthy of notice here. The basin is also traversed by a considerable number of faults, of which about 24 have been proved, the one-third of which occur at Merthyr. The faults range generally north-west and south-east, and are nearly parallel. There are also traces of other faults ranging east-north-east and west-south-west. These latter exhibit a greater displacement of level than the former. In the great fault in the Pontypool and Mynyddyslwyn district the difference of level is about 150 yards, and in the great Moelgilau fault, near Llangeinor, about 450 yards. The displacement in the northerly and southerly, the class of faults first mentioned, though variable, is much less, ranging from 6 to 8 yards up to 100 yards, as in the Gellygaer fault. In some of these faults the displacement increases as they pass south, and in others the reverse is the case. The lateral separation is inconsiderable, never above 8 or 12 yards. There are no trap dykes. The coal in the immediate neighbourhood of these faults is rendered tender or rotton for a breadth of from 10 to 15 yards on either side. Besides the anticlinal and the faults, the geological incidents of the coal field, there is found a class of phenomena which affects materially and favourably the winning of the coal. This is the very deep and extensive valley system by which the measures are intersected. Here are none of those broad plains which elsewhere have rendered necessary for the winning of the coal shafts often of a very great depth. Much of the coal here won has been obtained by levels driven up the crop, and although the mode of working necessarily becomes less and less applicable, the shafts required are less deep, and, therefore, less costly than would be the case were the valleys less numerous. So completely is this the case that of the deeper shafts as yet sunk in the district that of the Dowlais Iron Company, at Vochrhiw, is only 430 yards, and those of Llwyn-y-pia and Dinas, in the Rhondda, are about 400 yards. Probably the average depth of the shafts throughout the district is about half this, or about 200 yards. The highest ground in the basin is Carn Mosyn, the summit of which is 1971 ft. above the sea, but even under this elevation the coal is capable of being worked, and, indeed, is already partially worked, from the deep natural excavations of Hirwain on the north, and the head of the Rhondda on the south. From a calculation furnished by Mr. Adams, of Cardiff, it appears that, taking into consideration the seams ranging from 1 foot and upwards, the quantity of coal, less the necessary deductions for faults, pillars, barriers, and small coal left behind—that is to say, the total workable coal in this division of the basin—amounts to 13,612,800,000 tons, of which there have been worked 649,600,000 tons, leaving to be worked 12,963,200,000 tons, about 95 per cent. of the original quantity, after making the above deductions. It is mainly to the complete intersection of the field by the great valleys of the Nedd, the Afon, the Ogwr, Taff, Rhymney, and Ebbw, and their subordinates, the Ely, Rhondda, Cynon, Sirhowy, and the Afon Llwyd, which falls into the Usk, that are due the facilities for rapid and economical working which characterise the South Wales coal field, and which have enabled it within the last 20 years to assume so great importance among the mineral districts of the kingdom. These advantages, great in themselves, have been materially aided by the extensive seaboard of the coal field, and the facilities for shipping afforded by its ports; and when to this comes to be added the rare quality of the coal itself, fitting it in the highest degree for the purposes of manufacture, of commerce, and of war, the question of its duration, which it is here attempted to solve, becomes of a very high importance indeed to the British empire.

THE DUKE OF NORFOLK'S COLLIERS.—A deputation from the colliers employed at the Duke of Norfolk's collieries, near Sheffield, waited upon his grace's agent on Thursday asking for an advance of 1d. per ton on Silkstone coal, 3d. per ton on Parkgate, and 5d. and 3d. per ton on some other kinds. Unless these demands are granted they will strike.

THE WIGAN COLLIERY EXPLOSIONS.—A meeting was held in the Mayor's Parlour, at Liverpool, on Thursday, to receive a deputation from Wigan, who are raising funds for the sufferers by the recent colliery explosions. The sum of 500*l.* was collected in the room, Mr. M'Iver, Mr. Gulon, and Mr. J. G. Morris, each giving 100*l.* It was stated that 15,000*l.* must be collected to allow each widow 5*s.* a week, and each fatherless child 3*s.* a week.

FLOODING OF A COLLIERY.—A very serious accident has happened at the New Winnings Colliey, near Sheffield, belonging to the Duke of Norfolk. In the colliery two seams of coal are worked, and in the dip workings of the lowest and most valuable seam vast quantities of water accumulate. To meet this difficulty a pumping-engine, capable of throwing 400 gallons of water out of the pit per stroke, has been erected. On Monday morning one of the buckets broke and fractured the pipe, leaving only one pipe available. This it was soon found was altogether inadequate to the work, and in a very short time the whole of the workings in that seam were flooded. The accident has thrown about 300 hands out of employment.

COLLIERY ACCIDENT.—An accident resulting in the death of two men occured at Earl Granville's Slippery Lane Pit, Shelton Colliery, Hanley. A new shaft had been sunk to the depth of 530 yards, and within 20 or 30 yards from the bottom a scaffold had been erected for the purpose of carrying on one of the lateral workings. Four men were descending the shaft for this inset, but when the cage had reached a point about 20 yards from the scaffolding the rope, from some unascertained cause, slipped from the drum, and the wagon ran rapidly to the bottom. As it crashed through the scaffolding one man was jerked out into the inset, and he was enabled to save one of his companions by dragging him from among the broken timbers. The other two men were precipitated to the bottom, and the whole of the steel wire-rope, weighing 4 tons, fell upon them, crushing them to death. The pit bank was covered with a crowd of anxious people all day, and the measures adopted for their recovery, under the direction of Mr. Stirck, Earl Granville's underlooker, were watched with great interest.

RECKLESS COLLIERS.—At Atherton, three colliers were charged with breaches of rules at the Astley and Tyldesley Coal Company's pits. Thomas Concannon, employed at the Brassey Mine, had violated rule No. 4 by working in the pit with his safety-lamp unlocked. The lamp of the fireman (Joseph Lowndes) went out, and in order to re-light it he procured the lamp of the defendant, but on taking it to the proper station to unlock he discovered that it had not been locked. The defendant was fined 21*s.* and costs, or one month's imprisonment—Patrick Concannon was charged with a breach of the same rule. On the 21st instant he was met by a man named Adam Grundy proceeding to the pit, with his lamp unlocked, for the purpose of descending. Grundy had been ordered to watch the men as an extra precaution in the event of their passing the lampman.—The magistrates imposed a penalty of 21*s.* and costs in this case also.—William Green, an old collier, who is employed by the same firm at the Crombouke Mine was charged with taking matches into the pit on the 16th inst. The man had been at work all day, and left behind a waistcoat, which was found to contain lucifer matches. Defendant pleaded that is was not his working waistcoat, but one he had on the previous day, and that he had forgotten the pocket contained matches. The manager (Mr. Southworth) believed this to be the case, and did not press the case so severely. The defendant was ordered to pay costs.

An explosion of gas took place at the Hastingley-lane, Colliery, Tewsbury, on Wednesday night. It appears that one of the men took off the top of his "Davy," and the gas instantly ignited. Seven men are badly burnt, two hopelessly injured. A second explosion was feared, and the hands left the pit

STEAM BOILER EXPLOSIONS.

The monthly meeting of the Steam Users' Association was held at the offices, Corporation-street, Manchester, on Tuesday; Mr. Hugh Mason, Vice-President, in the chair. Mr. L. E. Fletcher, chief engineer, presented his report, which was for two months. Nine explosions have occurred, by which seven persons were killed and twenty-two others injured. In addition to these another may be mentioned, which sprang from a sulphur pan at a chemical works. This pan was heated by steam from a boiler at a pressure of 35 lbs., and gave way at the top from want of adequate stays. The telegraph wires close by were broken, but fortunately no personal injury was inflicted. The mention of this may possibly prove of service to those who are employing sulphur or other pans heated with steam, by showing the importance of having such vessels adequately staved. An explosion, by which one man was injured, occurred at an iron mine. The boiler was one of a series of five, all of the plain cylindrical, egg-ended, externally-fired class. The boiler was rent into four pieces, while the adjoining boiler in the series was moved from its seat and indented in two or three places by the blows it received. The other boilers in the series were in a neglected state, steam blowing at the joints of the man-hole cover, the feed back-pressure valve box, the safety-valve and steam junction valve box, while the safety-valves leaked at the seatings, and had a brick added to the weight at the end of the lever in order to stop the escape of steam. This proved, however, as might be expected, of no avail. Such attempts to cure leaking safety-valves, that can only be set right by being ground true, are both absurd and dangerous, and should never be adopted. The boiler which burst was an old one. It had worked for 14 yeas at the pit at which the explosion occurred, after having seen service elsewhere before that. The manner in which it was plated was very irregular, being partly longitudinal and partly transverse, while the boiler was much patched, and had been turned round end for end on its seating, and thus fired first from one end and afterwards from the other. The examination made of the fragments of the boiler was not sufficiently lengthened to admit of a positive decision being arrived at as to which of the rents was the primary one, but, looking at the facts described above, there seems little reason to doubt that this explosion may be attributed to the generally dangerous character of the plain cylindrical externally-fired boiler, coupled in this case with old age and rough usage.

An explosion, by which several persons were injured, took place at a colliery. The boiler was one of a series of six, all of plain cylindrical, egg-ended, externally-fired construction. This explosion appears to have been caused by local weakness at the ring seams of rivets, at which the front hemispherical end parted from the remainder of the boiler, the patch applied at that part having set up a seam rip, while the quality of the plates was by no means first-class. An explosion, by which four men were injured, occurred on Saturday, Sept. 16, at a mine. The boiler was of the internally-fired Cornish class, having one furnace-tube running through it from end to end, in which the fire was placed. With regard to the cause of the explosion, though the furnace-tube was as much as 32 ft. long by 4 ft. in diameter, and barely ⅜ in. thick, while it was worked at a pressure of 45 lbs. on the square inch, yet it had no strengthening appliances of any sort, in consequence of which it was not fit for more than half the pressure at which it was worked, and thus collapsed simply through weakness.

EXTRACTING MERCURY FROM ITS ORES.—By the patent of Mr. ADOLPH PATERA, of Vienna, Austria, he claims—"1. Employing, for the extraction of mercury from mercurial ores, a muffle or pipe heated from the exterior, and having one end open for the access of air, while the other end is connected with means for condensing the vapours evolved, the whole constructed essentially as described, and essentially for the purpose of excluding the mercurial ores and vapours from contact with the fuel and products of combustion, and of preserving a regulated temperature—2. Employing, in connection with a muffle or pipe, constructed substantially as described, and for the purpose aforesaid, any kind of device for producing a draft of air through said pipe and condensing devices, essentially as described—3. Employing, in the extraction of mercury from mercurial ores by the process and means described, a temperature slightly exceeding 360° centigrade, but not exceeding 500° centigrade, substantially as and for the purpose described—4. Employing, in the extraction of mercury from mercurial ores by the process and means described, the ore in the form of coarse powder, to enable the distillation to take place at the lowest possible temperature."

DRESSING ORES.—By the invention of Mr. J. BOYNS, St. Just, Cornwall, while the ore is held in suspension in the water, newly-broken fresh streams of clear water are brought into action upon it, to separate it from the waste, and also to separate the different sized ore before it is allowed to deposit or settle down, and means are afterwards applied for the treatment of the various classes of ores.

REDUCING IRON ORES.—The improvements of Mr. T. S. BLAIR, of Pittsburg, U.S., consists in reducing pulverised iron ores to the metallic state, and if desired carburising the same by forcing, reducing, and carburising gases under pressure through a layer of the ore. For this purpose the pulverised ore is either introduced at one end of the inclined perforated floor of a long horizontal chamber, through the perforations of which the gases are forced; or the ore is introduced into a vessel similar to the "Bessemer converter," having a perforated bottom, through which the gases are forced; or the ore is passed down a series of superposed inclined and perforated plates inside a chamber, so as to pass from the one plate to the next below, while the reducing gas is forced in from below and caused to pass in jets through the perforations of the plates, so as to act upon and at the same time agitate the stream of ore. The ore is reduced to the requisite state of pulverisation by passing it in succession through a series of pairs of crushing rollers set at different degrees of fineness, the ore being made to pass from the one set of rollers to the other over shoots having holes, through which the finer particles of ore fall. At the bottom of the machine the fine ore is separated from the coarse by the action of a blast of air.

IMPROVED IRON FURNACES.—The invention of Mr. JAS. ADDIE, Langloan Ironworks, Coatbridge, consists in a mode of reducing the iron either from its calcined or uncalcined ores by causing a gas, or mixture of gases, such as is obtained from coal or other carbonaceous fuel in what are known as gas-producers, to pass over and through the ores in a suitable furnace. It is proposed to make the furnace of a cylindrical form, of about 30 ft. in length and 8 ft. in diameter, and inclined at an angle of about 45° of the circle.

IMPROVEMENTS IN PUMPS.—In carrying out the improvements invented by Mr. H. EHRHARD, of Chemnitz, Saxony, the valve-seats are formed to carry their valves in a slightly conical cylinder, which is received into a correspondingly formed chamber of the pump, and this cylinder is there held by a plate formed to embrace a part of the smaller end thereof, and by turning on inclined surfaces formed thereon and against the end of the cylinder-chamber, to draw the cylinder tightly in position. The larger end of the cylinder is formed with a handle to facilitate its removal or the placing of it in position. Passages in the valve-cylinder, and its chamber, communicate with the respective ends of the piston-cylinder and the other ways. The chamber for the valve-seats, with their valves, is at the lower part of the pump, the passages therefrom to the respective ends of the piston-cylinder rise one on each side to the piston-cylinder, which is at the upper part. The air-chamber, when one is employed, is formed between the valve-chamber, the passages therefrom to the piston-cylinder, and the piston-cylinder, and the whole of these parts are, by preference, formed in one casting. The parts of the stuffing-box to the piston-rod and the connecting joints to the inlet and outlet passages are formed with inclined surfaces for clips, so that by turning them on these inclined parts tightening of the joints is effected.

BENDING METAL TUBES.—The essential feature and mode of operation involved in the machine invented by Mr. CHARLES HÖLLER of Cincinnati, U.S., consist in passing the sheet metal pipe or tube by a step-by-step motion over a mandril, at the end of which are two sets of clamps or jaws surrounding the pipe, and operating in such manner in combination with a rocking disc or head situated inside the pipe beyond the end of the mandril, that as the pipe passes over the end of the mandril the one set of clamps or jaws is caused to close down upon the pipe, nipping it upon the end of the mandril, while the other set of clamps closes down and nips the pipe upon the rocking head, which on then being forcibly brought together with the last-named clamps and the portion of the pipe nipped thereby, close up to the end face of the mandril and the first-named clamps, bends up or crimps a portion of the circumference of the pipe situated between the two sets of clamps, and thus by a succession of such crimpings or bendings at short distances apart, the elbow or bend is formed on the pipe. The pipe is held during the operation by a sliding collar on the mandril, to which a step-by-step motion is imparted by a rack and a spring pawl actuated by a cam or eccentric on a transverse shaft. The shaft carries a second cam or eccentric which imparts the rocking motion to the head by means of a connecting rod passing through the mandril, which is made hollow for this purpose.

THE NEW ALLOY OF COPPER AND IRON.—Dr. Meyer, of California, is said to have invented a new alloy composed of copper and iron, united in certain proportions, to form a substance which can be tempered to a hardness greater than that of steel, and can be easily worked. It is claimed that it can be used with great advantage for such articles as shoes and dies of stamp-mills, for instance; and, on account of its great hardness, will outlast by a very considerable length of time those now made of chilled cast-iron, while they can be manufactured just as cheaply. Moreover, the alloy is of such a nature that it is not liable to oxidation on exposure to the atmosphere. The principal object of the invention is, however, to make malleable metal which can be tempered to the utmost hardness, and which, therefore, can replace steel in many of its applications, while being much cheaper. The mode of manufacture constitutes the Doctor's secret. Alloys of iron and steel are well known, and possess some of the features claimed for his alloy by Dr. Meyer, but we doubt the alleged fact that he has produced a metal which for hardness and durability will supersede steel.

IMPROVEMENTS IN STEAM-ENGINES.—The invention of Messrs. INGLIS and SPENCER, of Westminster, relates to improved arrangements or combinations of the parts of steam-engines designed for marine purposes, but also applicable otherwise. In the improved arrangement or combination the engines are what are called "compound," and comprise a small high-pressure cylinder and a large low-pressure cylinder placed side by side. The steam is transferred from the former to the latter by means of separate intermediate tranverse cylindrical valves, and the steam may be exhausted from the large cylinder by the same kind of cylindrical valves or otherwise; but the present invention consists in combining with such arrangements one or two rectilinearly sliding valves to admit the steam into the high-pressure cylinder, and which are by preference worked by the usual link-motion.

HYDRAULIC MACHINES TO BE APPLIED AS MOTIVE-POWER.—The novelty of the invention of Messrs. DAVIES and HUTCHINSON, of Liverpool, consists in giving a revolving motion to a shaft from a head of water acting upon buckets at an angle of about 45°, enclosed in a circular casing, and allowing the exhaust water to pass down a pipe of larger bore than the feed pipe, terminating in a cistern or well, in a manner that the water when passing from the exhaust will by its rapid descent and terminal water joint cause a partial vacuum below the buckets, thereby aiding by suction the weight of water in the buckets giving revolution to the bucket shaft, the same being used as a motor for hoisting or for other driving purposes.

IMPROVEMENTS IN STEAM-BOILERS.—In this tube or fire-box of vertical boilers, constructed according to the invention of Messrs. JONES and HACKING, of Swansea, conical tubes are inserted, open at their outer or larger ends and closed at their inner or smaller ends and extending to near the centre of the said tube or fire-box. The said conical tubes are arranged in circular series one above another, each series having a baffle plate inserted in the central space formed by the inner ends of the tubes, thereby causing the flame from the fire underneath to be deflected and directed towards the larger ends of the tubes, also strengthening the tube or fire-box against the tendency to collapse.

IMPROVEMENTS IN STEAM-ENGINES.—The invention of Mr. HERBERT VOSPER, of Southsea, consists in working the slide-valves of steam-engines direct from the piston by means of rods or tappets on the ends of the slide-valves, such rods or tappets passing through the steam ports, and projecting a short distance inside the cylinder.

COPPER ORES.

Sampled Sept. 6, and sold at the Royal Hotel, Truro, Sept. 21.

Mines.	Tons.	Price.	Mines.	Tons.	Price.
Devon Great Consols	110	£1 3 6	South Caradon	56	£5 15 0
ditto	108	1 18 0	ditto	55	6 14 0
ditto	101	4 3 0	ditto	53	11 1 0
ditto	94	3 17 6	ditto	52	10 19 0
ditto	92	2 10 0	ditto	50	10 15 0
ditto	91	1 1 0	ditto	38	6 14 0
ditto	86	1 5 0	ditto	31	2 15 0
ditto	78	3 11 0	Brookwood	74	6 0 0
ditto	75	1 6 6	ditto	68	2 13 0
ditto	70	1 18 0	ditto	53	2 11 0
ditto	64	1 3 0	ditto	41	2 13 0
ditto	63	1 5 6	ditto	26	11 0
ditto	61	3 18 0	West Maria & Fortes.	96	3 2 6
ditto	58	2 11 0	ditto	63	2 18 0
ditto	55	1 16 0	ditto	42	6 14 0
ditto	51	2 14 6	ditto	17	3 11 0
ditto	37	4 1 6	Wheal Friendship	89	5 2 6
ditto	31	1 19 0	ditto	85	1 18 0
ditto	30	3 8 6	ditto	29	11 7 0
ditto	10	27 10 0	East Caradon	81	5 9 0
ditto	0	27 10 0	ditto	70	4 4 0
Marke Valley	104	2 10 6	ditto	44	1 8 0
ditto	101	2 10 6	West Caradon	43	4 6 0
ditto	75	2 8 6	ditto	42	2 13 0
ditto	64	2 16 6	ditto	41	3 9 0
ditto	51	4 7 6	Gunnislake (Clitters).	52	4 2 0
ditto	50	1 16 6	ditto	44	3 7 0
ditto	45	3 13 6	ditto	26	2 5 0
ditto	40	5 13 6	Franco Consols	20	1 19 0
South Caradon	72	5 17 0	Virtuous Lady	14	3 7 0
ditto	62	6 11 0	Perran Wheal Virgin.	4	5 10 0
ditto	59	4 2 6			

TOTAL PRODUCE.

Devon Great Con.	1374	£3674 7 0	East Caradon	195	£ 799 1 0
Marke Valley	530	1587 1 0	West Caradon	126	436 16 0
South Caradon	528	3779 15 0	Gunnislake, &c.	122	439 6 0
Brookwood	262	1230 19 6	Franco Consols	20	89 10 0
West Maria, &c.	218	823 2 0	Virtuous Lady	14	46 18 0
Wheal Friendship	203	949 12 6	Perran W. Virgin	4	22 0 0

Average standard.....£101 1 0 | Average produce.....
Average price per ton.....£3 17 0
Quantity of ore.....3596 tons | Quantity of fine copper.. 234 tons 8 cwts
Amount of money.....£13,799 7 0
LAST SALE.—Average standard.....£101 14 0—Average produce.....
Standard of corresponding sale last month, £98 8 0—Produce, 6¾.

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Names.	Tons.	Amount.
Vivian and Sons	828½	£2007 15 1
Grenfell and Sons	170	674 6 0
Sims, Willyams, and Co.	571	2404 11 0
Williams, Foster, and Co.	674½	2501 4 10
Mason and Elkington	575½	2080 4 1
Copper Miners' Company	285	1907 2 0
Sweetland, Tuttle, and Co.	489½	1184 4 0
Total	3596	£13,799 7 0

NO SALE on Thursday last.

Copper ores for sale at Tabb's Hotel, Redruth, on Thursday next—Mines of Parcels.—West Wheal Tolgus 504—West Wheal Seton 310—Crenver and Wheal Abraham 303—Carn Brea 241—Wheal Seton 241—South Wheal Crofty 221—Dolcoath Pool 225—North Treskerby 136—North Crofty 132—New Pembroke 80—Carn Camborne 74—Wheal Basset 73—Wheal Jewell 43—Wheal Prosper 32—Phillips' Vein 24—Bampfylde 20—Puglehole's Ore 18—East Basset 12—Cargoll 8—St. Aubyn United 4—Wheal Comford 2—Tremillian's Ore 2—Moss's Ore 2.—Total, 3717 tons.

London: Printed by RICHARD MIDDLETON, and published by HENRY KNIGHT (the proprietors), at their offices, 26, FLEET STREET, E.C., where all communications are requested to be addressed.—*September 30, 1871.*